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THE USE OF POLYGRAPHS AND SIMILAR DEVICES BY FEDERAL AGENCIES

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON GOVERNMENT OPERATIONS HOUSE OF REPRESENTATIVES

NINETY-THIRD CONGRESS

SECOND SESSION

JUNE 4 AND 5, 1974

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THE USE OF POLYGRAPHS AND SIMILAR DEVICES BY FEDERAL AGENCIES

TUESDAY, JUNE 4, 1974

HOUSE OF REPRESENTATIVES,
FOREIGN OPERATIONS AND
GOVERNMENT INFORMATION SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 2203, Rayburn House Office Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representatives William S. Moorhead, Bill Alexander, James V. Stanton, John N. Erlenborn, and Ralph S. Regula.

Also present: William G. Phillips, staff director; Norman G. Cornish, deputy staff director; L. James Kronfeld, counsel; and Stephen M. Daniels, minority professional staff, Committee on Government Operations.

Mr. MOORHEAD. The Subcommittee on Foreign Operations and Government Information will please come to order.

This series of investigative hearings into the use of so-called "lie detection" and telephone monitoring devices by the Federal Government has a twofold purpose:

First, the last hearings on these subjects were conducted a decade ago and Congress needs to know whether Federal agencies have increased or decreased their use. Simply put, this is an updating.

Second, over the past several years technological changes have occurred in both fields which have grave implications on the question of invasion of privacy. It is time to look at these developments.

Our purpose is not to duplicate the extensive and detailed investigations led by the subcommittee's former chairman, Representative John Moss of California. The subcommittee then covered that ground once and issued reports with appropriate recommendations. Those reports and related committee prints are contained in your folders.

What we want to know is exactly where we stand now. In my view, the Nation is getting extremely impatient over the whole question of invasion of privacy and snooping by the Government regardless of how well meaning such practices might be.

We realize that many of these efforts by Government originally were designed as the means to a worthwhile end. But does the end—no matter how good—justify the means? And what are the opportunities for possible abuses? Do the taxpayers want to finance the use of these devices? Are there better ways to accomplish the same goals?

And should the goals themselves be given a hard look? Would it be appropriate to recommend any new legislation?

I think we should keep all of these questions and others before us throughout these entire hearings.

With these remarks, I will now yield to the ranking minority member of the subcommittee, Hon. John Erlenborn of Illinois, for any comments he would like to make.

Mr. ERLENBORN. Thank you, Mr. Chairman. I don't think I have any comments to make at this time.

Mr. MOORHEAD. The first witness the subcommittee would like to hear from is Mr. Robert Smith, associate director, privacy project, American Civil Liberties Union, Washington, D.C.

Mr. Smith, this is an investigative hearing and in accordance with the practice of the subcommittee I would like to administer the oath.

Do you solemnly swear that the testimony you are about to give the subcommittee will be the truth, the whole truth and nothing but the truth, so help you God?

Mr. SMITH. I do.

Mr. MOORHEAD. Thank you. You may proceed.

STATEMENT OF ROBERT E. SMITH, ASSOCIATE DIRECTOR, PROJECT ON PRIVACY AND DATA COLLECTION, AMERICAN CIVIL LIBERTIES UNION FOUNDATION

Mr. SMITH. Mr. Chairman——

Mr. MOORHEAD. Before you proceed, if Mr. Alexander has any comments to make, we will welcome any statement.

Mr. ALEXANDER. I will defer until later.

Mr. MOORHEAD. Mr. Smith?

Mr. SMITH. Thank you, Mr. Chairman. I do appreciate your remarks very much because I think it is proper to view these hearings as an update of previous work done by the House and Senate and also to view this issue essentially as an issue of privacy.

The polygraph machine used as a so-called lie detector I think essentially raises privacy issues. We should point out that the polygraph is a device attached to an individual intended to measure certain physiological changes, which are supposed to indicate conflict and therefore truthfulness.

You will hear lots of dispute as to just how reliable this device is, but aside from the reliability issue the use of the polygraph raises some very grave constitutional issues. We view it as an invasion of constitutional rights aside from the fact of whether it is accurate or not. Mr. Chairman, the American Civil Liberties Union Foundation, in its concern for the Bill of Rights, seeks to protect the privacy of the citizens and that really is, as I pointed out, the reason for our being here.

It is our belief that no person should be required, by moral or legal compulsion, to submit to a lie detector test. There is a lack of qualified experts to administer tests and there are few if any objective and truly fair situations for a person to take the test and a habitual or pathological liar can "beat" the machine. But even if the device were regarded as totally reliable, we would still oppose the use of the poly-

graph just as we oppose the use of wiretaps. Polygraph testing, like the use of electronic surveillance, infringes on several constitutional guarantees, notably one's right to privacy. For a person to decline to subject himself to a polygraph test, to the harassment or the terrifying ordeal of a polygraph test, should not be considered evidence of guilt nor in fact of concealment. The findings of the polygraph should not be admitted into evidence in court, and I should note that just about every court in the land agrees with that. A polygraph test, when offered on a supposedly voluntary basis to a large number of persons whether they be employees of a Government agency involved in the national security or a private firm selling groceries, a polygraph administered on this wide-scale basis, even when purportedly voluntary, is essentially compulsory and therefore is improper. The use of the polygraph should be prohibited at all levels as a condition of employment, both in the private and the public sector.

I would like to briefly point out our constitutional objections to the polygraph and then make note of a few case situations that are very graphic and last, Mr. Chairman, point out to you some of the new technology that raises some very grave issues.

The first amendment protects free speech. The Government has always been kept out of one's views as opposed to one's conduct, and a polygraph gets into one's views so that whenever the Government lends its support to this sort of testing, whether the questions involved are simply control questions or warmup questions, they invariably get into first amendment protected views.

The fifth amendment to the Constitution provides the right against self-incrimination. This too is violated in a polygraph situation because essentially the test is compulsory. A person is faced with the alternative of not being employed or being fired or not receiving a security clearance if he does not submit to a polygraph test. This can result in self-incrimination in violation of the fifth amendment.

And the sixth amendment assures the right to confront one's accuser. And as Senator Ervin so eloquently pointed out in the Watergate hearings, you can't very well cross-examine something that isn't alive, something that is written. A polygraph machine by definition cannot be cross-examined and therefore its use would violate the sixth amendment to the Constitution.

And the fourth amendment protects us against unreasonable searches and seizures. And to the extent that polygraph results are shared with third parties, their use would constitute a violation of that amendment.

The courts have found that the Bill of Rights taken as a whole constitutes a right to privacy and it is this combination of rights to privacy too that is violated in the use of polygraph testing.

Briefly, some examples that I refer you to—and these are in my written statement—some examples of persons victimized by indiscriminate polygraph uses——

Mr. Moorhead. Mr. Smith, without objection, your entire statement with the examples will be made a part of the record at the appropriate place.

Mr. Smith. Thank you, Mr. Chairman. They point up two things. One, to my horror, after I started researching this, the polygraph ex-

aminer apparently is not under any compulsion himself to tell the truth. Deception seems to be part of the technique of making the polygraph exam work. Second, the subject is convinced of the infallibility of the machine. In my first example, the interrogator stated: "I won't have any trouble reading your charts." And then the second case, the youth was described as a "textbook reactor." And both of these persons were deprived of food and sleep during the course of the examination.

Complaints about employers' use of the polygraph are the second most common source of complaints to the American Civil Liberties Union privacy project here in Washington. One Ohio woman complained to the ACLU of Cleveland that as a condition of employment with a retail grocery store she and her colleagues were required to sign a statement which reads:

> In the event of an unexplained shortage, I agree that if requested by the company, I will take a polygraph test administered by the Truth Verification Agency regularly engaged by the company.

Mr. STANTON. What is the name of that company?

Mr. SMITH. The firm that forces a person to sign that? The 7–11 Corp. I understand this is true nationwide.

Mr. STANTON. The 7–11 Co. doesn't operate in Cleveland, Ohio.

Mr. SMITH. Southland Corp. is the name of the corporation.

Mr. STANTON. They don't operate in Cleveland, Ohio.

Mr. SMITH. Well, she complained to the ACLU of Cleveland. It may well have been outside of Cleveland.

Mr. STANTON. Mr. Chairman, I would like to get the name of the corporation. He has alleged a serious allegation in his statement and hasn't really verified it. I would like to have verification of what corporation and where.

Mr. MOORHEAD. Is this in your written statement?

Mr. SMITH. No.

Mr. STANTON. Did the incident occur in Cleveland?

Mr. SMITH. I have the form with me here. I do not know whether it occurred in Cleveland. I do know the complaint was filed with their office.

Mr. STANTON. I would like to see it.

Mr. MOORHEAD. Do you have the complaint?

Mr. SMITH. I do. I would appreciate that the complainant's name not be used.

Mr. STANTON. I have no interest in the name. I would just like to know the name of the corporation.

Mr. SMITH. The Southland Corp.

Mr. MOORHEAD. Just so not to slow down the proceedings, maybe after Mr. Smith is finished he could supply that name to you?

Mr. STANTON. Fine.

Mr. SMITH. I would be pleased to do that. Thank you.

The form further went on to say that the employee would be bound by the report of such test, but in addition to that in the case of a refusal to take the test that the employee would agree to compensate for whatever amount was missing.

And another case was reported in the press where the President of the United States in fact told the head of his Plumbers unit when

they were assigned to investigate leaks in the national security in the summer of 1971:

> I want every [S.O.B.] in the State Department polygraphed until you find the guy. . . . It's more important to find the source of these leaks rather than to worry about the civil rights of some bureaucrats.

I think that goes to the heart of this inquiry. And the plumbers proceeded to conduct some polygraph examinations administered by the State Department, the Pentagon, and the CIA.

These examples could be considered first generation polygraph problems, but consider the possibility that polygraph results now could be computerized and subject to instant retrieval or that the results could be transmitted at long distance while the test is going on.

We are afraid that polygraph results, like wiretap transcripts, will take on a life of their own. They will be shared by many who have no need to know. We are concerned that they will become must reading. Another characteristic of the polygraph is that at least the subject is aware that the test is being conducted. This is no longer true with the new technology. One example is the so-called voice analyzer, better known by the trade name of the psychological stress evaluator or PSE, which was developed by the Dektor Counterintelligence & Security, Inc., of Springfield, Va. This is a portable "truth verification" device that could be administered without the subject's knowledge because it requires no physical contact with the individual. The lie-detector relies on respiration, blood pressure, and galvanic skin response on the assumption that untruths cause conflict that is reflected in measurable psychological change. The psychological stress evaluator relies on voice analysis, on the principle that when a person is under stress the FM modulation in his voice disappears leaving only the AM modulation. This, according to the manufacturers, may be used on a broadcast or tape-recorded voice. There is very little hard evidence as to the reliability of this device although there was much in the popular press about it especially when the Watergate hearings last summer were going on, Mr. Chairman, when it was possible, supposedly, to plug in one of these devices to the television set to tell who is lying, although the results were never really publicized as much as the gimmick in the first place.

Decision Control, Inc., claims that its method is as reliable as polygraph testing but its conclusion is based on only three subjects.

I would like to point out at this point that one of the techniques of the new technology seems to be to compare that reliability of these new devices with the polygraph instead of comparing them with hard facts that might support truth and fact. In spite of that, the PSE is gaining popularity among employers, law enforcement agencies, and psychiatrists and psychologists, and ACLU affiliates have taken steps to limit its use especially in this embryonic stage of its development.

The device is portable and of course may be administered without the knowledge of the public.

A study for the Army Land Warfare Laboratory sheds very serious doubt on the reliability of the voice analyzer device and I recommend that to the committee. We may have reached the point where the Government snoopers who favor such devices as the truth verification

machines and the wiretaps could combine these so that one not only could listen in on conversations but also allegedly determine who is telling the truth.

These are not just 1984 pipedreams as the ACLU experiences with Government surveillance have shown. But there is more. Maybe the PSE itself is outmoded. We have information that the Weizmann Institute of Rehovot, Israel, has developed a "microwave respiration monitor" which allegedly determines truthfulness remotely and without the knowledge of the subject by monitoring the vibrations of the stomach, the theory being that one's respiration increases the vibrations of the stomach and therefore indicates whether one is telling the truth. This can be used remotely at border crossings, airports, lineups, and the like.

Now comes a professor at Kent State University in Ohio who claims to have discovered a lie detection technique that works on a subject who never opens his mouth. It works, too, on an intoxicated or drugged individual because it measures responses in the eye's retina to questions or comments. In other words, after the operator makes a statement the operator peers into the eye of the individual to determine whether he is telling the truth. And I was shocked to understand that persons have been denied employment at Kent State University based on this technique.

Also in at least one case a not guilty plea was changed to a guilty plea as a result of the use of this technique. We may have come full cycle since the time of trial by ordeal when one's ability to endure fire told whether he was innocent or guilty. Now apparently by peering into one's eye we can tell whether one is telling the truth or not. I would like to last, Mr. Chairman, raise some questions that I am sure are going to come up in your inquiry.

What are the possibilities of linkup among these devices, with computers or with other new hardware?

Isn't there an obligation on the part of polygraph operators and PSE operators to tell the truth themselves?

Is there a lesson to be drawn from the fact that these devices seem to originate in the military or intelligence community, and then they are foisted on the civilian population?

And to what extent are Federal funds being used to support research into lie detector devices?

Last, and the largest question in our minds, will the mere existence of these devices create a chilling effect on the population, making candid phone conversations a thing of the past and making blandness or perhaps even professional lying a prerequisite for Government service? Another question, will citizens throughout this country make decisions about law enforcement and employment suitability, or will we delegate that responsibility to machines?

I appreciate the opportunity to appear, Mr. Chairman, and with your permission would like to submit for the record an ACLU report on the lie detector as a surveillance device and two speeches by Senator Ervin in which he outlines his objections to the lie detector.

Mr. MOORHEAD. Without objection, that will be made a part of the record. Your prepared statement also will be included at this point.

[The material follows:]

ACLU REPORTS

THE LIE DETECTOR

AS A SURVEILLANCE DEVICE

By

John Shattuck
Patricia Brown and Stephen Carlson

February 1973

Note: This is a press copy. When reissued in April the Report may contain slight textual and footnote changes.

AMERICAN CIVIL LIBERTIES UNION

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Preface

The American Civil Liberties Union strongly opposes compulsory submission to any form of mechanical lie detector test. The Union's policy statement on the polygraph was adopted in 1954 and reads in part: "No person may be required, by moral or legal compulsion, to submit to a lie detector test. The alleged lie detector, at least at this stage of its development, is not ready to be compulsorily administered, in view of the lack of a sufficient number of experts to administer tests and interpret the results, the temperamental unsuitability of many subjects, and the fact that an habitual or pathological liar might pass the test even if he is guilty."

The 1954 policy, however, was qualified by the statement that "[n]o civil liberties objection can be made to a person's volunteering to subject himself to a test." With the increasing use of polygraph testing in the last decade by employers and industrial security agencies, this qualification became less realistic. Recognizing that polygraph testing in the employment setting is potentially an invidious method of surveillance where "consent" is meaningless, the ACLU in 1966 stated that it "opposes at all levels the use of lie detector tests as a condition of employment and seeks legislation to prohibit their use in both the public and private fields."

This Report explores the use of the lie detector as a surveillance device. While it focusses chiefly on employment screening, the Report reaches general conclusions about the scientific validity of the polygraph machine and the impact on polygraph testing on the constitutional rights of test subjects.

John Shattuck
ACLU Staff Counsel

February, 1973

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In his eternal quest for truth, man has consulted the Delphic oracle, gazed into crystal balls, and constructed the polygraph machine. The polygraph machine, used as a "lie detector", has become the center of serious controversy. Its advocates claim to be able to protect society from liars, cheaters, thieves, and sex perverts, among other undesirables, while its opponents argue that the polygraph is at best of dubious reliability and constitutionality. The controversy ultimately revolves around the machine's scientific validity and its effect on individual liberties.

I. PATTERNS OF USE

Although there are no reliable figures on the number of persons giving polygraph examinations or the number of tests administered annually in the United States today, polygraph experts and critics both agree that uses of the machine have increased significantly in the past five years, primarily in the pre-employment screening area. According to Robert J. Ferguson, Jr., a leading polygrapher, over 500,000 polygraph tests for pre-employment purposes were conducted in 1968, by approximately 3,000 polygraph examiners.[1/] In a recent New York Times article a former president of the American Polygraph Association, J. Kirk Barefoot, is quoted as estimating that between 4 and 5 thousand polygraph examiners were working in private industry in 1971 and that 200,000 persons would be given polygraph tests in

that year.[2] Costs are quoted as ranging from $15-65 per test, with higher prices for more difficult or spectacular cases and low rates reserved for customers who do mass screening with a polygraph firm. Figures for use by military agencies and federal, state and local governments have not appeared since the mid 1960's.

The reasons given for increased use of polygraphing in pre-employment are heavy rates of theft in industry (now more than $3 billion a year, according to insurance industry sources); problems with drug use and drug-related crimes among employees; alleged difficulties in conducting effective career-verification and background investigations through standard methods;[3] and, less openly cited, desires to screen for loyalty-security and anti "agitator" purposes.

The "lie detector" machines in use today range from models which measure only one phenomenon, the "galvanic skin response," to complicated machines which measure several responses.[4] In fact, multi-response ("polygraph") lie detection has developed to a point where polygraph tests can now be administered without the subject's knowledge by a machine known as a "wiggle seat" which registers body temperature, changes in limb volume, and nervous movements. Hidden cameras which measure change in eye-pupil size as an indicator of stress during the interview are also in use.[5] Finally, a device has recently

been developed to detect lies by measuring the stress elements in voice modulation.[6]

A. Testing Techniques and Assumptions

The actual operation of the polygraph varies considerably with the examiner. There are, however, two polygraph experts, John E. Reid, director of John E. Reid and Associates School, and Cleve Backster, director of the Backster School of Lie Detection, whose techniques set the tone of operations for the bulk of the industry. The Reid technique is described in Truth and Deception: The Polygraph (Lie-Detector) Technique, written by John Reid in collaboration with Fred E. Inbau, Professor of Law at Northwestern University.

Before the test is actually administered, Reid and Inbau suggest that "much can be gained from preliminary observations of the subject from the time he enters the examination office or reception room."[7] A receptionist or secretary carefully observes the subject and records actions supposedly indicative of feelings of nervousness or guilt. These actions range from too much artificial coughing and sneezing to too much shifting of feet and suspicious eye movements. Reid maintains that the examiner can establish a psychological advantage over the subject by filling the waiting room with books, magazines, and other publications which tell of the "infallibility" of the lie detector.[8] "The subject has got to have some kind of fear of having his lie detected

by this technique . . . . he has got to have some respect for it."[9] Of course there is always the possibility that the subject will not read the literature or that he is so skeptical that the literature will not convince him, but merely reinforce his disbelief in the polygraph's effectiveness.

The test itself must be conducted in an environment free from extraneous stimuli such as witnesses, secretaries, reporters or outside noises.[10] The testing room is generally small, conservatively painted, and sparsely furnished. The room should contain no ornaments, pictures, or other objects which might prove distracting to the subject. Reid and Inbau fear that such objects might "permit[the subject] to capitalize on their presence for psychological evasion efforts."[11] The room is arranged so that the subject looks straight ahead and the examiner is seated at his side behind a desk containing the polygraph equipment which the subject cannot see.

Both Reid and Backster have "observation rooms" adjoining the examination room. An observation room is equipped with a one way mirror through which the subject can be seen but cannot himself see, and a microphone system on which he can be heard. The room is used so that the examiner can station witnesses to protect himself from charges of physical abuse of his subjects. It also provides a way to train examiners. Finally, the room gives the

examiner an opportunity to watch the subject respond to the general test experience when he is left alone between tests.

After tying a pneumatic tube to the subject's chest, applying a blood pressure cuff around his upper arm, and attaching a set of electrodes to the subject's hand, the examiner begins a pre-test interview. To Reid and Inbau this should be a formalized procedure in which the examiner attempts to infuse the subject with a further sense of the reliability of the polygraph. During this proceeding, the examiner carefully notes the behavior of the subject. When discussing the matter to be investigated, a lying subject, in Reid's view,

> is rather prone to speak evasively or in generalities about the matter in question. Many times, he will, in contrast to the truthtelling subject, squirm around in the chair, look away from the examiner, cross his legs, use his hands as though trying to dust something off his clothes, or engage in other similar physical activity.12/

Following this general interview, the examiner goes over in detail the exact questions to be put to the subject. In doing so, he hopes to be able to adjust the wording of the questions so that there can be no doubt about their meaning, and so that they can be answered with a simple "yes" or "no".

During the examination, the polygraph records physiological changes in respiration, blood pressure, and galvanic skin response. The central premises are that: (1) lying leads to conflict, (2) conflict causes fear and anxiety, and (3) these mental

states are the direct cause of measurable physiological changes.[13]

The pneumatic tube works rather simply by measuring expansion and contraction of the chest to record the rate of breathing. The blood pressure cuff records blood pressure and pulse rate, as in a medical examination. The electrodes are used to record what is known as "galvanic skin reflex" or the "the electrodermal response" -- that is, "changes or variations in the conductance of external current between the palmar and dorsal surfaces of the subject's hand."[14] Authorities disagree on what precisely causes galvanic skin response changes, but it appears that increases in the quantity of perspiration on the skin tissue is a major factor.

B. Questioning the Subject

The questions asked during the test are based upon the results of the pre-test interview and whatever basic facts and circumstances are relevant to the matter being examined. Questions, of course, vary according to the person being tested. There are nonetheless certain basic models of examination advocated by both Reid and Backster and roughly followed throughout the industry. The three most frequently used tests are the "control question" test, the "card test," and the "peak of tension test."

The "control question" test is used to determine whether responses are in fact the result of the questions being

asked, rather than extraneous factors such as naturally high blood pressure or an extreme propensity to perspire under interrogation. Interspersed with the key questions are irrelevant ones such as, "were you born in this country?" Reid has a very formalized theory of the proper order in which to ask relevant and irrelevant questions. "Matched questions reveal the norm for the subject. Asked about a robbery which never occurred, an innocent person might provoke a heightened response. But his response when questioned about the robbery under investigation should be no greater."[15/]

The "card test" requires the subject to lie. He is to select one of seven cards and to answer "no" to each question as the examiner goes through the cards asking him if each one was the one he drew. The examiner is then able to tell the subject which card he drew by detecting which "no" was a lie. Reid and Inbau actually conduct this test on a rigged basis by having arranged the cards so that they know independently of the polygraph findings which card has been selected. The purpose of the test is to establish the subject's further belief in the accuracy of the polygraph by dramatically displaying its ability to arrive at the truth. The card test is also useful in helping the examiner determine the "normal" range of reactions of the subject while he is lying.

Cleve Backster uses another rather dramatic examination method known as the "peak of tension test." For this test to be most effective the examiner must know something about the topic of investigation, or ' have obtained some object belonging to the subject of the examination, which the subject would not expect him to know or possess. At appropriate "psychological" moments the examiner displays or mentions the evidence and records the subject's reaction.[16/]

There are many variations of these basic tests. Depending upon the specifications of the case being investigated, up to five different types of tests may be used on the subject at one sitting. There are models for continued testing of those subjects who cause difficulty. These include a test known as the "mixed questions" test in which the order and specific wording of the questions is altered; the "yes" test in which the subject is told to answer all questions affirmatively; and a "guilt complex" test in which the subject is questioned about a fictitious affair in order to determine if he simply suffers from general guilt feelings. If the results are not satisfactory by that point, the examiner will often ask the subject to return for a re-examination.

What does the examiner hope to learn from particular types of questions? In the employment screening context, Robert

J. Ferguson, Jr., a leading polygrapher, suggests that "every employer wants to ascertain six basic factors contained in the makeup of every prospective employee." These are:

1. Are you who you say you are?
2. Are you what you say you are?
3. Will you fit in?
4. Are you physically fit?
5. Can you work in harmony with other employees?
6. Can you treat customers (and/or equipment) the way they should be treated?

In order to probe for the truth on these matters, Ferguson states that "the polygraph examiner generally utilizes a specially prepared pretest data sheet." 17/ After 10 "norm questions" this data sheet contains 65 questions organized under the headings of "general questions," "job responsibility questions," "accident prone questions," and "security questions." Under "job responsibility questions," the job applicant is required to answer such questions as "Will you be satisfied with the starting salary?" and "Are you seeking long-term employment with this company?" Under "accident prone questions," the applicant is asked, "Are you attempting to conceal the existence of any present physical disbility or health problem?"; "Have you ever filed for or collected workmen's compensation insurance from an on the job injury?"; and "Have you ever sought psychiatric consultation for any reason?"

Questions on Ferguson's form under the heading,

"Security," are all of dubious constitutionality. These include the following:

> Are you applying for this job for any reason other than employment?
> Are you being planted on this job for any purpose?
> Are you aware of any activity within this company which is designed to change its present policies and procedures?
> Do you belong to any group which advocates overthrow of the American system of government?
> Are you now or have you ever been a communist sympathizer?
> Do you actually know anyone who has ever written a threatening letter to the President or the Vice-President of the United States?
> Did you ever try smoking marijuana?
> Have you ever found it necessary to sue a former employer for any reason?

II. WHAT IS A LIE?

The polygraph tests that we have been describing measure certain physiological changes which are assumed to constitute evidence of mendacity. As Reid and Inbau admit, however, "there is no instrument that mechanically supplies the answer whether a suspect is lying or telling the truth."[18] No bells ring, no lights flash. Only a few squiggles are drawn on a piece of paper. Burke M. Smith, another polygraph operator, has noted in an article in Scientific American that "although a few

practitioners still call the commercial polygraph the 'lie detector', it is generally agreed that the machine records not lies but physiological changes."[19]

Nevertheless, the polygraph examiner claims that he is in the business of "lie detection." The Advocate, a publication of the Retail Clerks Union, points out that the "judgment about whether a person is lying or telling the truth rests solely with the operator."[20] According to the late J. Edgar Hoover, "90% of the polygraph's usefulness depends on the careful evaluation of the results by experienced examiners."[21] George Lindberg, a former president of the American Academy of Polygraph Examiners goes even further by maintaining that the accuracy of a polygraph test is "100% examiner."[22]

How does the examiner read the results of a polygraph test? His first problem is how to define "truth" and "lie." Webster's Dictionary defines "lying" as "making a statement or statements that one knows to be false, especially with intent to deceive."[23] Yet Dr. Martin T. Orne, a senior resident psychiatrist at the Massachusetts Mental Health Center and a Harvard Medical School professor, testified in hearings on the polygraph before a subcommittee of the House Government Operations Committee under the chairmanship of Congressman John Moss of California ("the Moss Committee"), "I don't know how to define a lie. . . It is not a

term which has been carefully defined by scientists. What a lie is, is a matter of point of view which varies with individuals."[24] Thus if someone who is color blind says a green suit is red, he is not lying.

On the other hand, since a lie is a subjective evaluation by the person of his own perception, a polygraph at best can record whether a person believes he is lying. Given the theory of lie detection -- that "the act of lying leads to conscious conflict, and conflict induces fear or anxiety, which in turn results in clearly measurable physiological changes"[25] -- if a person believes what he says, even if what he says is not factually correct, he will experience no conflict. Thus if someone who is mentally ill believes he is Napoleon, the polygraph will record that he is telling the truth.

Nor is a belief in the truth of incorrect statements necessarily a symptom of mental illness. Since morality differs among people, "the underpaid store clerk, who pockets the money from a small sale each day to cover his bus fare, may actually believe the money is 'rightfully' his."[26] In such a situation, if asked the question, "have you ever stolen any money from the store?" the store clerk could respond negatively and the polygraph would record that he is telling the truth.

Moreover, even if a person is not telling the truth and

knows that he is not, he may still have no recordable responses to his lying. As Reid and Inbau point out in their book, however, the lie detector can function accurately only if the subject believes that the machine can record his deception. In fact, "unless a person is concerned over the possiblity that deception will be detected, his polygraph records will not disclose that deception."[27] This is the rationale behind such "stimulation" tests as the "card test" and the "peak of tension" test.

Many subjects,however, cannot be induced to believe in and fear the machine. Reid and Inbau describe those who are unimpressed by the testing techniques as "unintelligent and uneducated and unable consequently to appreciate the possibility of their deception being detected by this means."[28] Also included are those without any sense of social obligation or responsibility and those who are apathetic to the test because they perceive no hope of ultimate clearance of suspicion.

A. Problems of Detection

By making a subject believe that the machine is an infallible lie detector, the polygraph operator can supposedly create an anxiety in the subject when he lies. Lying, however, generally evokes a variety of responses, as Jerome H. Skolnick notes in an atricle in the Yale Law Journal:

> In our society people cannot go through life without lying, and every individual builds up his own set of responses to the act. Lying can conceivably result in satisfaction, excitement, humor, boredom, sadness, hatred, as well as guilt, fear or anxiety. Not uncommon are pathological individuals who for various reasons, believe in their lies and are totally unconcerned about them[29]

Thus the subject may be lying, but the polygraph may record no signs of fear. Moreover, since the test environment itself may cause anxiety, a subject may be telling the truth but the machine's tracings may be interpreted to indicate that he is lying.

Dr. John Lacey of the Fels Research Institute and Antioch College, asked in his testimony before the Moss Committee, and "What are the physiologic recordings measuring?" gave the obvious answer: "physiologic response."[30] The polygraph operates on the premise that lying will produce a change in physiological activity. The major changes are in salivation, heart rate, breathing and skin temperature. There is no clear physiological relationship among these various changes, however, and it is therefore claimed by polygraph proponents that "several measures yield greater precision than any single one."[31] On the other hand, the operators concede that "it is seldom that a lie is clearly indicated by distinct changes in the cardiac, respiratory and galvanic skin response traces; the variations are usually small, and often mutually contradictory."[32]

The polygraph operator therefore, must decide which among several small contradictory changes to believe. Considerable intuition is involved. As one examiner puts it, the analysis is "a Gestalt process."[33/] Most polygraph operators have one favorite response upon which they rely when conflicts occur. Although this varies among blood pressure, pulse rate and respiration, most examiners agree that the galvanic skin response is the least accurate, and should be ignored when a conflict occurs.

The subject's physical condition at the time of the test can always influence the tracings. Fatigue, drugs, or alcohol will distort the polygraph record.[34/] More important is the state of mind a subject is in when taking the test. Among the conditions of which Reid and Inbau warn are extreme nervousness, anger or overanxiety to cooperate with the test. Other factors which can affect test results are: worry by the subject that his neglect of duty or responsibility allowed someone else to commit the act under investigation; previous involvement by the subject in an act similar to those under investigation; inattention of the subject to the test because of anxiety about extraneous personal problems, excessive interrogation prior to the test, or excessive questions and prior tests.[35/] The physical discomfort of the subject because of the presence of the machine, the room temperature, the need to use bathroom facilities

or even the suppression of a cough is always recorded by the polygraph.[36] Two Harvard psychologists and a graduate student in industrial management at M.I.T. concluded that although lying will produce physiological changes;

> other factors often produce physiological changes which are very similar. For example, there is the real danger that the changes which occur are not the result of 'a feeling of guilt' itself, but rather of recalling some information, or a shift of attention, or perhaps a sudden fear of the consequences of being pronounced guilty.[37]

The advocates of the polygraph, on the other hand, maintain that an experienced examiner "can deal effectively with the psychological and emotional abnormalities with a relatively high degree of accuracy."[38] The pre-employment examination is supposedly the basic factor in eliminating the abnormalities. During that time the subject can express his fears about extraneous matters, while the examiner can observe the physical state of the subject. If the subject is oversensitive, the examiner can calm him; if he is unresponsive, the examiner can instill in him a fear of the polygraph. Abnormalities, it is claimed, can also be eliminated by a careful reading of the tracings. If there are conflicts in the tracings, so that a result is unclear, more tests can be taken and compared. In this way such recorded aberrations as a suppressed cough would be revealed.

B. Probing the Subconscious.

A more complicated problem is whether the polygraph records physical manifestations of subconscious as well as conscious thoughts or feelings. Some experts contend that the polygraph merely records response to conscious feelings, relying on the Freudian position that "it is surely the essence of emotion that we should feel it, i.e. that it should enter consciousness. So for emotions, feelings and affects to be unconscious would be quite out of the question."[39/]

Other experts, particularly psychiatrists, contend that the polygraph can record the results of subjective and unconscious thoughts involuntarily communicated.[40/] An example is the case of a bank manager who was subjected to a routine polygraph examination. When asked if he had ever stolen anything from the bank or its customers, he showed a positive response. Although he could not remember taking any money he confessed to having stoled $1,000 after his peak of tension test showed strong reactions at $800 and $1,100. The bank's auditors, however, could find no shortages. During a psychiatric examination, it was discovered that his reactions were caused by guilt feelings over personal financial dealings of $800 and $1,100 with his mother and wife. Both were customers at the bank. After a second polygraph test, in which the words "bank" and "customers of the bank" were used in separate sentences, the examiner again

decided that the manager was guilty. A careful study of the polygraph record, however, showed that a strong reaction occurred only to the sentence with the words "customers of the bank." When the facts were further uncovered the subject retracted his confession.

Similar violent responses can occur when coffee or smoking are mentioned to someone who has guilt feelings about them. Indeed, one expert concluded that "any word that happens to have strong emotional connotations for an individual and that is included in a critical question may elicit a response that is erroneously attributed to an attempt at deception."[41/]

Since it is evident that many actions are recorded by the polygraph, can a subject then distort his physiological activity and thereby "beat" the machine? During the Moss Committee hearings, Dr. Orne testified that "we may consider the ability of the individual to produce a GSR (galvanic skin response) at will, to inhibit respiration at will, to increase his heartbeat at will, as within the repertoire of the normal human being."[42/] Actions like controlled breathing and muscular movements can then successfully mask lying. Reid and Inbau, however, maintain that an experienced operator should be alert to both activities.[43/] The Reid polygraph, which records some muscular activity, was designed to safeguard against controlled muscular movements.

Some types of psychological evasions are very successful.

For example, by "transferring his thought process from the relevant to the irrelevant questions or from the matter under investigation to some other one of his offenses or wrong doings of a similar nature,"[44] the subject can invariably avoid detection. Counting the small holes in the acoustic tile blocks in the wall of the examination room or saying religious prayers are other ways the subject can upset the machine.[45]

C. The Operator.

Because of the subtleties involved in a polygraph diagnosis even the most ardent advocate of the polygraph recognizes the need for capable, experienced operators. From the results of an exhaustive study of the polygraph industry, Frank J. Horvath and John E. Reid concluded that "the accuracy of the experienced examiners was significantly better than that of the inexperienced examiners."[46]

Reid and Inbau recommended as basic qualificaions, intelligence with a reasonably good educational background, preferably a college degree. Other essential qualifications for an examiner are "an intense interest in the work itself, a good practical understanding of human nature, and suitable personality traits which may be evident from his otherwise general ability to 'get along' with people."[47] After these qualifications are satisfied, extensive training is required. The length of instruction ranges from six weeks to six months.[48]

Nevertheless, it is generally recognized that "there are too many incompetent and amateur examiners who pose and operate as lie detector experts."[49] Professor Inbau estimates that 80% of the 2,000 to 3,000 operators in the United States are substandard.[50] Perhaps the main reason is that in 38 states anyone who purchases a polygraph may claim to be a professional polygrapher.[51]

Even after instruction, however, Skolnick warns of the interpretive bias of the examiner. Persons who readily are influenced by the operator to accept the lie detector, for example, are often more likely to be judged innocent by him than those who obnoxiously reject it. Moreover, the operator's first impressions have also been shown to have a marked impact on his later evaluations.[52] Since the polygraph is based so much on interpretation by the examiner, Skolnick feels that the polygraph should only be used as a police tool whose function is "to open up leads to further investigation of information rather than being itself prima facie evidence."[53]

III. POLYGRAPH TESTING AS A SCIENCE.

Taking all of these many variables into account, what is the scientific validity of the polygraph? Richard O. Arthur, a polygraph industry expert, is optimistic:

> The results of properly administered polygraph examinations are very accurate. The latest estimation based upon a five year study of those persons tested by the senior author, accords to his polygraph technique an accuracy of over 96% with a 3% margin of inconclusive (indefinite) determinations, and a 1% margin of maximum possible error.[54]

John E. Reid and Associates claim 94% accuracy, 5% "inconclusive," and less than 1% known error.[55] A study reported in the polygraph journal, Lie Detection and Criminal Interrogation, involving 4,280 examinations, reported that definite results were obtained in 4,093 or 95.6% of the tests and that out of these only 3 known errors were discovered.[56] Almost all of the known errors are cases judging guilty men innocent.[57] The New York State Bar Journal estimates an accurate conclusion in approximately 80% of the cases. The remaining 20% are too inconclusive for an operator to diagnose.[58] 70% is the success rate attributed to polygraphers by the American Bar Association.[59]

A. Battle of Statistics

The variations in these sets of statistics are partially accounted for by the fact that each is drawn from a different study. The known error figure is generally based upon all those determinations of innocence or guilt which were later found to be false, the inaccuracy having been established through subsequently developed factual evidence. An inconclusive figure includes those cases in which the examiner was unable to render a decision because the tracings were too contradictory. Any case in which the examiner is able to make a determination which subsequent factual evidence does not disprove, therefore, is counted as accurate.

There is no proof, however, that all of the cases in which no subsequent evidence to the contrary is found have really been accurately diagnosed. In fact, evidence to prove the accuracy of the diagnoses is generally scanty. During the Moss Committee hearings, for example, the following colloquy occurred between Congressman William Reuss of Wisconsin and a polygraph expert:

> Congressman Reuss: Do I understand correctly that actual proof of the accuracy of the polygraph was only obtained on 18.9% of the cases?
> Mr. Lindberg: Yes.

Which set of statistics can one believe? The majority of studies on accuracy have been done by commercial operators. A team of professional psychologists at M.I.T. conducted one of the few independent studies made of polygraph test results. They

concluded:

> There exists no public body of knowledge to support the enthusiastic claims of operators. There are no publications in reputable journals, no facts, no figures, tables, or graphs. In short, there is nothing to document the claims to accuracy or effectiveness except bald assertions. 60/

There are several reasons why a reliable set of statistics is almost impossible to obtain. First, most statistics begin with the assumption that the operator is qualified. As Inbau himself notes, however, over 80% of the operators are not qualified. Moreover, the figures are based only on tests administered in the investigation of a crime, and in many such cases it is never discovered, either through confession or subsequently developed factual evidence of guilt or innocence, who actually committed the crime. Reid and Inbau admit that "proof is often lacking whether the examiner in any given case was right or wrong." 61/

There are several ways, therefore, in which the validity of accuracy statistics can be questioned. In general, it is impossible to know whether the polygraph operator has made an incorrect judgment unless the case becomes a "known error," determined on the basis of independent evidence or confession. If a crime remains unsolved Reid and Inbau will claim 100% accuracy for the polygraph examinations, claiming that the tests' determination that all subjects are innocent is corroborated by a lack of confessions or factual evidence indicating a

guilty party in the offense. This statistical claim, however, necessarily tends to classify guilt with innocence.

B. Conditional Probability

Professor Skolnick points out that "even if the accuracy figures given by Inbau and Reid are valid in some situations, their validity at all times and in all places cannot be assumed."[62] He maintains that accuracy will be influenced by the composition of the group of persons taking the test. Any device which is used to determine a state of being--e.g., lying, or epilepsy, or paternity--is subject to a qualification known as "conditional probability."[63] The term refers to the fact that unless the diagnostic instrument has 100% unconditional accuracy, the probability of its accuracy in any single case is dependent upon the prevalence of the condition being diagnosed in the population group to which the test is being given.[64] The more people in the group who have a certain condition, the higher will be the probability that those diagnosed as having such a condition do in fact have it.

The proportion of liars, for example, might be higher among convicted prisoners, than among the residents of a religious monastery. If one used a polygraph to test for liars in both groups, therefore, the conditional probability would be higher among prisoners than among monks. This means that of the people diagnosed to be liars, more liars will have been

correctly diagnosed in the group of prisoners than in the group of monks.

Translating this into percentages, assume that a polygraph expert is testing to find embezzlers in a group of 1,000 bank employees. Given a polygraph with an unconditional probability of 95% (the success percentage generally claimed by polygraph experts), 95% of the 1,000 bank employees will be correctly diagnosed. That means that 950 people will be correctly diagnosed, while 50 people will be incorrectly diagnosed. If, in fact, 25 of the employees are embezzling and 975 are not, then 95%, or 24 of the 25 guilty will be correctly labeled as guilty, while 5%--one person-- will be falsely found to be innocent. Meanwhile, however, 95% of the 975 innocent, or 926, will be correctly diagnosed as such. Thus 5%, or 49 people, will be incorrectly said to be embezzling. Out of the 73 people the polygraph has diagnosed to be embezzling, 24 of them were actually embezzling. The conditional probability, therefore, that someone said to have been embezzling actually was embezzling is $\frac{24}{73}$ or about 33%.

If there are fewer embezzlers in the group, for example 5 embezzlers, a polygraph with 95% accuracy will still diagnose 950 people correctly and 50 people incorrectly. Of the 995 innocent 95% or approximately 945 will be diagnosed as such. 50 people will therefore be incorrectly said to be embezzling. Meanwhile, of the 5 embezzlers, 95% or almost all

5 will be correctly diagnosed as such. Thus the conditional probability that someone found by the polygraph to be embezzling really was embezzling is now $\frac{5}{55}$ or only about 9%. The fewer the people with the condition one is seeking in the population, therefore, the smaller will be the chance that someone diagnosed by the polygraph as having the condition actually has it.

C. Employment Screening

Validity of the accuracy statistics varies greatly with the circumstances in which the polygraph test is administered. In cases where there are few people with the condition, it is likely that a largenumber of people will be falsely said to have the condition. This is particularly true in cases of employment screening where even if the polygraph had a high unconditional accuracy, it would still unfairly deny a large number of people jobs since few persons tested will be found never to have lied. As Skolnick suggests:

> Whatever the unconditional accuracy of the lie detector, the number of false positives (incorrect determinations of guilt or deception) is related to the number of true positives (actually guilty of deception subjects) in the population being tested. This fact would make the use of lie detectors, even if they had a high unconditional accuracy, questionable in those situations--such as personnel screening--in which there are few true positives in the population.65/

It is particularly in cases of pre-employment screening and promotion investigation, therefore, that the polygraphers' statistical claims of accuracy tend to collapse. It is impossible to ascertain if a person who was not hired because of his poly-

graph test would have actually made a good employee. Furthermore, studies have shown that the rejection rate is higher when polygraphtests are used by an employer than when he conducts a standard personnel check. The Illinois Retail Merchants Association reported that employers who use traditional background screening and reference checking reject 2% of their applicants because of bad references. When the polygraph examination is used, however, the rejection rate jumps to 40%.[66/] With the polygraph's unreliability in arriving at a truthful conclusion and its low conditional probability with regard to pre-employment screening, it is apparent that many people who have been screened by the polygraph are unfairly denied jobs.

Not only does the polygraph eliminate many trustworthy individuals; it also fails to screen out untrustworthy persons. An article in Readers' Digest, for example, documents the case of two employees of the National Security Agency who passed a polygraph test in order to get security clearances. Both men, however, later defected to Moscow.[67/]

D. The Verdict of Science

A number of recent expert studies have concluded that the polygraph has little, if any, scientific validity. The House Government Operations Committee under the leadership of Congressman John E. Moss, reported, after intensive investigation, that "there is no lie-detector, either machine or human. People

have been deceived by a myth that a metal box in the hands of an investigator can detect truth or falsehood."[68] Drawing from a 10 year period in which over 200,000 tests were administered by the Department of Defense, Dr. Jesse Orlansky of the Institute for Defense Analysis concluded that "up to the present time it has proved impossible to uncover statistically acceptable performance data to support the view held by polygraph examiners that 'lie detection' is an effective procedure."[69] Finally, the AFL-CIO Maritime Trades Department determined in their study that "the claims made for the 'lie-detector' by its supporters are fraudulent and easily refuted by the facts. The body of evidence available makes it abundantly clear that no machine and no individual can measure truth and deception, [illegible] innocence or guilt."[70]

The conclusions of those empirical studies are generally endorsed by experts from the medical and social sciences. Two psychiatrists at the University of Virginia School of Medicine, for example, point out that "the application of the polygraph technique as a lie-detector technique is fraught with too many variables and sources of error for it to be used as it is currently being used in business and industry."[71] Nor can these variables ever be totally eliminated a sociologist argues, since the fundamental assumptions behind the use of the polygraph as a lie detector cannot be verified: "There seems to be little evidence that upholds the claim to a regular relationship between lying

and emotion; there is even less to support the conclusion that precise inferences can be drawn from the relationship between emotional change and physiological response."[72] In essence, therefore, while the polygraph experts claim a high degree of accuracy for their tests, there are enough pieces of contradictory evidence to raise a substantial doubt. The very fact that there is doubt about the validity of polygraph testing argues against its use.

IV. CIVIL LIBERTIES AND THE POLYGRAPH

There are two arguments against polygraph testing. The first refers back to the issue of reliability. As has been demonstrated, there are many reasons to doubt the accuracy of test results. These include the fundamental assumption that lying induces fear and anxiety, which in turn produce recordable changes in physiological activity; the heavy burden placed upon the operator properly to interpret these recorded physiological changes; and the possibilities of "beating" the machine. Since the failure to pass a polygraph test can result in social stigma, loss of job and difficulty in securing another job, questions about the reliability of the technique are magnified in the employment setting.

A. Invasion of Privacy

The second argument against polygraph testing has nothing to do with the dubious accuracy of thepolygraph technique, but

is addressed to its effect on the privacy and liberty of the individual. Few of the labor boards, regulatory agencies and courts which have criticized and rejected the use of polygraph machines in a variety of contexts have based their criticism on this argument.[73/] Instead, as Professor Gerhard Mueller of New York University Law School has suggested, the courts and other critics seem to be "merely using the scientific imperfection argument to avoid the issue of the ethical justification for probing man's innermost sphere."[74/]

The tendency by polygraph critics to avoid constitutional and ethical arguments against the machine is perhaps understandable in light of all the available evidence that the polygraph technique is unreliable: it does not seem necessary to make a mere theoretical argument which implicitly appears to concede reliabliity.

The ethical argument, however, has been a persuasive influence against the use of the polygraph in several other countries. In Europe, as Professor Alan Westin points out, "the courts, legal codes, and authoritative commentators have long rejected the lie detector as an impermissible police technique, not on the ground of its error ratio, but because it is felt to violate the essential dignity of the human personality, and individuality of the citizen. It was this formulation of the issue that led Pope Pius XII in 1958 to condemn the lie detector

(along with narco-analysis for investigative purposes) as an intrusion into man's 'interior domain', invalid morably even when used for governmental purposes." [75] For similar reasons the German Supreme Court banned polygraph testing in a landmark decision which held that the technique is an unconscionable interference with the integrity of the person, echoing Dean Roscoe Pound's formulation of the right to personal privacy:

> At first only physical injury is considered. Later, overcoming the will is held a legal wrong; in other words, an individual interest in free exercise of the will is recognized and secured. [76]

While courts in this country have been generally reluctant to give a full dress consideration of the constitutionality of polygraph testing, it is nevertheless essential to frame the issue in ethical-constitutional terms, particularly in the context of employment screening. The Retail Clerks International Association, for example, takes the position that "one of the most degrading aspects of the lie detector test is its affront to human dignity and values." [77] This position is echoed in academic studies. Dr. Joseph Kubis, Professor of Psychology at Fordham University, for example, insists that "the threat to use the lie detector on a continuous basis in industrial and business organizations is degrading. The fundamental dignity of man is the issue." [78] A special subcommittee of the AFL-CIO Executive Council presented a report on polygraphs in 1965, which concluded that "the use of lie detectors violates basic considerations of

human dignity in that they involve the invasion of privacy, self-incrimination, and the concept of guilt until proven innocent."[79] The report was adopted by the Executive Council in a resolution which states, "We object to the use of these devices, not only because their claims to reliability are dubious but because they infringe on the fundamental rights of American citizens to personal privacy."[80]

Professor Alan Westin in his book, Privacy and Freedom, isolates three fundamental issues in characterizing the invasions of privacy which result from polygraph screening:

> First is the attempt to penetrate the "inner domain" of individual belief, tendency, and inclination through the questions on such topics used so often in polygraph sessions. The American Constitution sets up a basic distinction between acts and beliefs, and the style of polygraph screening . . . violates the injunction against inquiry into belief by government. Second is the interference with the individual's sense of personal autonomy and reserve created by machine sensing of the individual's emotional responses to personal inquiries in a formal, pubilc proceeding. If individuals confess because they feel they have lost their basic autonomy, we may detect some personnel risks, but we will leave citizens stripped of what made them feel like independent persons in a free society. Third is the increased psychological power over individuals that authorities acquire when they can apply the full panoply of large black box, moving stylus, wires, two-way mirrors, formal interrogation, and so forth, to a citizen seeking to work for a corporation or a government agency in a free society. The system of due process in America has truth seeking as only one of its purposes; the other two basic rationales are to preserve individual dignity and to place limits on the use of power by government. A society in which

> government straps its employees to a machine and makes judgments about their qualities in such a manner, or allows corporations to do so, can scarcely be called a society that adheres to the basic ideals of due process. Such a practice may be tolerated for certain special situations, but these must be limited to the smallest possible number.81/

Even the staunchest advocates of polygraph testing admit there is an invasion of privacy. J. Kirk Barefoot, Director of Corporate Loss Prevention at Cluett, Peabody and Company, however, feels that "there comes a time when your privacy and mine has to be weighed against the company being stolen blind and put out of business."82/ Most polygraph supporters, fail to understand the thrust of the privacy issue. The Council of Polygraph Examiners, for example, addresses the issue as follows:

> The last major objection is that the polygraph examination invades the employee's privacy. In a sense this is true: certainly the larcenous servant would prefer to keep his crime hidden from inquisitive employers. Both the employer and society in general have a legitimate interest in combating dishonesty in American business and industry. The culprit's coworkers also have reason to demand the apprehension of the larcenous or fraudulent employee. Hence the invasion of the thief's privacy is a price that must be paid. 83/

This answer misses the point of the criticism. When an objection is raised that polygraph testing results in an invasion of privacy, what is sought to be protected are the rights of innocent people who will be forced to undergo the test along with the thief. The Council, however, states that "it is difficult to see how any honest employee's privacy is unfairly invaded by asking

him to tell the polygraph examiner that he was not engaged in larceny or embezzlement at a given time."[84] This comment appears to ignore a basic premise of the polygraph test that discovery of honesty in one matter can only be determined after the subject has "unburdened" his conscience on all related topics.

B. Other Constitutional Objections

The Council's final comment dismissing the privacy issue raises the first of a series of additional constitutionally-inspired objections to the use of the polygraph: "The fact that one has not been stealing is hardly the sort of thing one should be determined to keep private."[85] This statement reverses the fundamental constitutional principle that one is presumed innocent until proven guilty. The polygraph advocates' lack of sensitivity to the presumption of innocence is further illustrated by a statement of John Reid: "I also believe that a person who is innocent owes society an obligation to cooperate and help the authorities prove him innocent rather than be defiant and say 'let them try to prove my guilt.'"[86]

Another constitutionally-inspired argument against polygraph testing arises from the Fifth Amendment privilege against self-incrimination. In introducing a Senate bill to regulate the polygraph, Senator Sam Ervin pointed out that "the machine is used to try to compel the individual to disclose information despite the guarantees of the Fifth Amendment to the Constitution

which provides the right against self-incrimination."[87]

In the course of the polygraph examination, because of the very nature of the technique, damaging personal information which one normally would not reveal is exposed. This results from the coercive and probing nature of the questions, and from the subject's defensive willingness to elaborate on his answers because he fears that unless he reveals all the details, the machine will record that he is lying even when his basic story is true. As one commentator concluded, "the polygraph technique forces an individual to incriminate himself and confess to past actions which are not pertinent to the current investigation. He must dredge up his past so he can approach the polygraph machine with an untroubled soul."[88]

It is perhaps reasonable, therefore, to agree with a prominent psychiatrist that "the lie detector is primarily a 'tool' for mental intimidation."[89] The polygraph people themselves admit that a polygraph test can be an intimidating experience. J. Kirk Barefoot feels that "most people have a compulsion to confess. They hesitate, of course, as long as they feel there is uncertainty as to their guilt. They may be uncertain about it within themselves. But once you remove that uncertainty--the thing the polygraph does best--they confess. Often they go so far that the examiner has to shut them up."[90] The first part of this statement speaks of people who know they are guilty but would not confess if it were not for the coercion

of the polygraph machine. The second part makes the extraordinary suggestion that under the influence of the polygraph people will admit to crimes they are not even sure they committed.

Polygraph advocates, however, contend that the argument that the polygraph violates the privilege against self-incrimination is specious. They argue that submission to a polygraph test is purely voluntary. John Reid, for example, is quick to point out that "no one who comes here has to take the test. They sign a voluntary statement."[91] Chris Gugas, President of the American Polygraph Association, stretches the point when he suggests that "voluntary application for a job which by its nature involves character is a tacit invitation to carefully scrutinize the prospective employee's background."[92]

Submitting to a polygraph test, however, is rarely "voluntary", at least within the ordinary meaning of that word. The Moss Committee stressed that "as long as notations are made in any official file on an individual that he has refused to take a polygraph test, the examination is in no sense voluntary."[93] Refusal to take a test is often interpreted as guilt. Even Reid himself asserts that "I wouldn't be here five minutes if we were putting the finger on the innocent," adding that "the people who resent the test, so many of them are guilty. They try to affect others not to take it, and that tells us a lot."[94]

The question of voluntariness also arises when the failure to take a polygraph test will result in economic sanctions.

Knowledge that one will not get the job or promotion unless he takes the test acts as a powerful incentive to submit to it. Since the choice facing an employee or a potential employee is often a Hobson's choice between incriminating himself through the polygraph test or facing the penalty of loss of job, loss of promotion, or not being hired, there can be no voluntary submission.

The absurdity of the "consent theory" in the employment screening context has been discussed at length by Westin, and warrants repeating here:

> It is important to understand the meaninglessness of such terms as "consent" and "voluntary" in the context of polygraphing today, and to reject these as tests for measuring the privacy interests at stake. Normally, consent of the individual to relinquish his rights of privacy closes the discussion of conflicting values. If for money, recognition, status, psychic needs, or ideological interest, a person waives his right to withhold consent, the law--and society--generally accept the individual's choice. In the new polygraph situation, however, the realities of coercing consent must be appreciated. Before World War II, when lie detectors were used primarily by official law enforcement agencies or company security forces to investigate particular crimes, and when the test results were inadmissible in courts, the setting of these situations usually made the giving or withholding of consent a meaningful factor . . . .
> There was a meaningful link, at least, between the specific person asked to take the polygraph test and a particular crime that had broken the public peace. To be sure, there were instances of police coercion of suspects into taking polygraph tests, or employer threats after a theft to dismiss all employees who would not verify their statements by polygraph. But these were clearly exceptions to the norm before World War II. They called for remedial action as specifics, but not for banning the polygraph entirely.

> Today, when "consent" is considered, it should be done in the realization that some nine million employees work for federal, state, and local governments; a conscription law passes a high percentage of American males through military service; and the blue-collar and white-collar working force for American corporations is more than forty million. Because of the trend toward polygraphing to provide theft security for government service, most of the adult working population of the nation now comes within the potential reach of "preventive" testing if the use of the technique continues unchecked.
>
> This is why "consent" has been redefined in the civic debates in the past decade, and properly so. When applicants for corporate or government service, normally well qualified, well recommended, and with no trace of criminality to raise questions, must submit to polygraphing or forsake these key sources of employment in American economic life. then "consent" is far from free. Or if, when once hired, an employee is required to "consent" to periodic preventive testing as a condition of continued employment, the employee's freedom of choice is substantially narrowed. No doubt these are the considerations that have stimulated civic commentators and have led state legislatures to pass bans on employer polygraphing requirements to override the companies' concerns over thefts and financial security. No doubt, also, these are the strongest considerations in congressional and state legislative pressures to hold preventive polygraphing by government agencies to situations of special conditions such as psychological make-up of policemen or security for national intelligence operations. They have also led labor union, civic, legislative, and judicial spokesman to invoke the right to privacy of employees as workers in a free society as the central reason for banning polygraph screening. 95/

A third constitutionally-inspired issue concerns the Sixth Amendment right to confront one's accuser and its effective circumvention by the polygraph. Since the polygraph is a machine, it cannot be cross-examined. Its mechanical results must be inter-

preted by the operator, thus making the evidence it produces mere "hearsay".

There is judicial support for this position. As one commentator put it, "a machine can not be examined or cross-examined: its testimony, as interpreted by an expert is, in that sense, the most glaring and blatant hearsay," 96/ Following thes reasoning, a Nebraska court has pointed out that the fact that "it is impossible to cross-examine the lie detector machine impairs one of the vital poocesses in law," 97/ a view concurred in by the Florida Supreme Court:

> The successful attempt by the prosecutuon by the means employed to implant in the minds of the jury the impression that because the witness had voluntarily submitted to a lie detector test prior to trial he must perforce be testifying truthfully in the course of the trial, resulted in effect, in the substitution of a mechanical device, without fair opporuunity for cross examination for the time-tested, time-tried, and time-honored discretion of the judgment of a jury as to matters of credibility. 98/

Several arbitration opinions have also concluded that the right to confront one's accuser is violated when the accuser is in effect a polygraph machine. 99/

In still another way the polygraph can be seen to infringe on the right to confront one's accuser. Results of pre-employment screening are frequently pooled and widely circulated in computerised systems of employment and credit information.

As a result, polygraph test results can be used repeatedly and long after an applicant is rejected or accepted by the employer for whom he originally took the test.[100]

A final constitutional objection to polygraph screening is that it makes a mockery of the protection against unreasonable searches and seizures secured by the Fourth Amendment. The use of a polygraph arguably constitutes an unreasonable search when an examination investigates a person in a deeply probing manner through a wide range of questions, and an unreasonable seizure when it takes and reveals to third parties the private thoughts, beliefs, and attitudes, of the subject. Polygraph advocates agree that they search the mind, but dispute that the search is unreasonable, since the information sought never leaves the possession of the subject. The Supreme Court, however, has repeatedly held that the Fourth Amendment protects conversations from unreasonable search and seizure without a party's express or implied consent, and there appears to be no reason to treat "polygraph conversations" differently.

C. Trial by Ordeal

A final argument used by opponents of the polygraph, which incorporates both the unreliability of the technique and its invasion of privacy, is based on its analogy to the medieval trial by ordeal.

Speaking of justice in the Merovingean Frankish kingdom, Professors Ralph Hagoffin and Frederic Duncalf describe as follows the process of trial by fire: "In the ordeal by fire . . . the accused had to carry a red-hot piece of iron in his hand; walk on hot plowshares; pass through a fire; or plunge his arm into boiling water. If the burns healed normally (without infection) the sufferer was declared to be innocent."[101] For the Bedouins of Arabia the lying person was the one whose tongue was burned after all suspects had licked a hot iron. Another test involved throwing witnesses in a pond or a river. Those who surfaced were guilty and suffered the consequences; those who sank were judged innocent and efforts were made to retrieve them. In seventeenth century England, authorities developed a method of trial by ordeal to ferret out practitioners of witchcraft which involved pricking suspects with long, sharp needles: the accused who felt pain were innocent, and those who did not were judged guilty.

None of these ancient methods of determining guilt are still in use in the civilized world, but as Senator Ervin has suggested, "in the case of the polygraph, we have not come very far at all from the ancient methods of trial by ordeal by fire or water to the concept of the 'wiggle seat'."[102] The analogy is hardly remote: "Does the flesh of the applicant burn when a hot iron is applied to it? When tightly bound and thrown into a

pond, does the applicant sink or float? When strapped in a chair with electrodes and other gadgets attached, does the rate of respiration and blood pressure of the applicant rise? Does the salt of his pores induce increased electrical conductivity? Are we reduced to alchemy as a technique of screening applicants for highly sensitive positions?"[103]

V. Summary

The fundamental assumption behind polygraph testing is that lying produces psychological conflict, which causes fear. This fear, in turn, produces certain physiological changes. Presumably, the assumption continues, these changes can be measured by the polygraph and interpreted by the examiner. Many problems, however, are implicit in this assumption.

First, lying will not result in conflict if the person believes what he says is true, has a different standard of morality, or has no belief in the polygraph's ability to separate truth and deception. Moreover, lying induces a variety of emotions, not just fear. In some people, it induces satisfaction, others happiness, and in others anger. Since fear does not produce the same physiological changes in all people, the lie detector is a polygraph rather than a unigraph. But any changes in physiological activity measured by one of the devices of the polygraph may be contradicted by an opposite change in one of the other devices. Often it is merely a matter of intuition for the examiner

to determine on which tracing to base his conclusion. Furthermore, a number of other factors can produce similar, and in some cases identical physiological tracings. These include the personality of the subject and his physical and mental condition at the time of the test. There is a debate over whether unconscious feelings can also be recorded by the machine. In any case, through various physical and psychological tricks it is possible for even the best examiner to come up with erroneous findings.

But most examiners are poorly trained. Even in those cases where certain minimum qualifications are set, they are not really pertinent to the psychological and physiological background one would like an examiner to have. Of course, even if adequately trained, the examiner will always have personal biases and characteristics that will influence the examination.

Today there is no valid statistical evidence that the polygraph is accurate. Because of the many variables and sources of error and the total reliance on predominantly unqualified examiners, it is unlikely that the polygraph machine as used today is accurate. Moreover, since there appears to be no truth in the fundamental assumption of the polygraph, that lying produces meaningfully recordable physiological data, it seems unlikely that current technology can ever lead to an accurate lie detector machine.

Even if the machine were one hundred percent accurate, however, there are important constitutional principles militating against its utilization. The entire polygraph process can be seen as degrading to human dignity. It can be seen as an invasion of privacy and infringement of fundamental human rights. The technique is contrary to the presumption that one is innocent until proven guilty. It seems to force one into a position of self-incrimination, since the subtle penalties against those who do not take the test are great. Furthermore, "accusation" by a polygraph abrogates the right to confront one's accuser. Finally, polygraph testing is an illegal search and seizure of the subject's thoughts, attitudes, and beliefs. In many respects these constitutional deficiencies make polygraph testing at least comparable to ancient methods of trial by ordeal.

Advocates of the polygraph contend that these rights, particularly those secured by the Fourth Amendment, only apply in cases of state or federal action and are therefore inapplicable in the context of the polygraph's use for private employment screening. While this is arguable in the context of a court case challenging the use of polygraphs in a private setting, we consider these protections such a fundamental part of basic human dignity that they should be applicable in the private as well as the public sphere. Through legislation our nation has repeatedly recognized that there are limits on the conditions an employer can impose on his employees or prospective employees. We propose

to put the use of polygraphs outside those limits.

In conclusion, the use of the polygraph machine is undesirable. There is a substantial dispute over its reliability. Moreover, given the present quality of operators, it can safely be stated that psychological diagnoses by the polygraph are highly questionable. Accuracy aside, the polygraph should not be used because it infringes on essential individual liberties.

APPENDIX A: REGULATION OF POLYGRAPH USES

There have been various attempts to regulate the use of the polygraph at federal, state and local levels of government.

One of the earliest attempts occurred in 1952, when a proposal was made in the House of Representatives to investigate government use of polygraphs and to determine if employees needed legislative protection. For ten years the proposal lay dormant. In March 1963, however, a Defense Department demand for polygraph tests of 120 federal officials to determine the source of an information leak triggered a full investigation of federal polygraphing by a subcommittee of the House Government Operations Committee chaired by Congressman John E. Moss (D. Calif.).

In its survey of 58 federal agencies, the Moss Committee discovered that 19 of them, excluding the CIA and NSA, had conducted 19,796 tests during 1963. After seven days of public hearings during which testimony was presented by polygraph operators, scientists, and spokesmen from the FBI, Post Office, and Armed Services, and four days of closed testimony by CIA spokesmen,[104] the Committee concluded:

> There is no lie detector; neither machine, nor human. People have been deceived by a myth that a metal box in the hands of an investigator can detect truth or falsehood.[105]

Turning to the federal government, it stated that "polygraph testing is extensive and growing. All too often it is used on

trivial matters."[106] It pointed out that most operators lacked proper qualifications, that administrative controls were weak, and that employees' rights were frequently violated.[107] The Committee, however, advocated reform rather than abandonment of the use of polygraphs by federal agencies, recommending that the federal government research the reliability of the polygraph, prohibit its use except in national security investigations, improve the training of federal polygraph operators, and restrict the use of two way mirrors.[108]

Since the Moss Committee hearings, the amount of polygraph testing done by federal agencies has been substantially reduced. The Defense Department, Post Office, Commerce Department, and the Atomic Energy Commission are among the agencies which have reported a decrease in their use of the polygraph.[109] The Defense Department has also issued a directive which establishes a training curriculum and admissions standards for its own polygraph examiners.[110]

The Central Intelligence Agency and the National Security Agency, however, continue the apparently unrestricted use of polygraphs.[111] Moreover, one source of information indicated that though the FBI itself claims rarely to administer polygraph tests, it often directs local police departments to administer tests on its behalf.[112] Nevertheless, the Moss Committee hearings are generally credited with "a tightening of procedures in the

use of these devices, a stated recognition of the right of the individual not to submit to this form of inquiry, and a general lessening of the use of polygraphs in the federal service."[113]

Senator Sam Ervin (D., North Carolina), Chairman of the Senate Subcommittee on Constitutional Rights, has been concerned about invasions of privacy for some time. On April 1, 1971, he and 51 co-sponsors introduced S. 1438, which was passed by the Senate in December 1971 (it has not yet been passed by the House). The bill is intended "to protect the civilian employees of the executive branch of the United States Government in the enjoyment of the constitutional rights and to prevent unwarranted governmental invasion of privacy,"[114] and as part of that protection it would limit polygraph use. Polygraph tests could not be administered to a government employee to obtain information about his personal relationships with members of his family, his religious beliefs or practices, or his sexual attitudes and conduct. The bill provides, however, that such information could be elicited by the CIA or the NSA if an appropriate official "makes a personal finding with regard to each individual to be so tested or examined that such test or information is required to protect the national security."[115]

Since the introduction of S. 1438, Senator Ervin has introduced a much more generalized polygraph control bill. This bill, S. 2156 is slated for hearings in the near future before

the Constitutional Rights Subcommittee. S. 2156 would make it illegal to "require or request, or attempt to require or request"[116] people to submit to lie detectors in order to obtain or to hold a job in the federal government or in any business affecting interstate commerce. Nor could any federal or private employer engaged in a business affecting interstate commerce in any way discipline or threaten to discipline an employee for refusing to take the test. Violators would be guilty of a misdemeanor punishable by a fine, not to exceed $1,000 or by imprisonment for up to one year, or both.[117]

Pressure for regulation is also coming from another direction at the federal level, in the form of a law suit sponsored by the Equal Employment Opportunity Commission. Basing its case on the protection offered under its own Guidelines on Employment Selection Procedure, the Commission charges the polygraph with being a discriminatory labor practice.[118]

At the state level various attempts have been made to regulate the use of polygraphs. Twelve states have now adopted statutes which, to various degrees, limit the power of employers to force employees or prospective employees to submit to lie detector tests as a condition of employment or continued employment. This legislation was all enacted within a ten year period, beginning with the passage of a prototype statute in Massachusetts in 1959.

Of the twelve states which currently have such laws, four--Hawaii, Oregon, Pennsylvania, and Washington -- only prohibit the employer from "requiring" a current or prospective employee to take a polygraph test. The California and Maryland statutes go a bit further and prohibit "demanding or requiring" such a test, while Massachusetts and Rhode Island prohibit "subjecting or causing" an employee to submit to a test. The wording in the four other states includes "request or require" in Connecticut, "require or suggest" in Alaska, and "require, request, or suggest" in Delaware. Perhaps the most strongly worded is the New Jersey statute which forbids "influencing, requesting, or requiring."[119]

As these variations in wording illustrate, statutes regulating the use of polygraphs by private employers invite a flexibility of interpretation. Statutes which only employ the word "require" are merely forbidding compulsory polygraph examinations. California's Attorney General Stanley Mosk clarified the meaning of his state's law which prohibits the employer from "demanding or requiring" by saying:

> Such tests may be requested and permitted by the employer. Therefore, the phrase 'demand or require' clearly refers to a mandatory request by the employer. An employer is permitted to ask or request submission to a polygraph test and such tests are permitted when they are voluntary.[120]

The statutes also differ in terms of their applicability to

employees and/or prospective employees, and whether they cover employers only or also anyone administering such a test for an employer. All of these variations in wording inevitably influence the effectiveness of the law.

The strength of the various laws can also be measured by the penalties provided for their violation. Punishments range from no specific penalties in Massachusetts, California and Connecticut, to Maryland's maximum of a fine of not more than $100, to fines of $1,000 and/or one year in jail in Alaska, Hawaii, and New Jersey.[121] The groups exempted also reflect the effectiveness of the law. New Jersey and Oregon are the only states with no exemptions. The most common exemptions cover law enforcement agencies and the police (Alaska, Connecticut, Delaware, Hawaii, Massachusetts, Pennsylvania, Rhode Island, and Washington), California and Maryland exempt all federal, state and local government agencies.[122]

Several cities have outlawed the use of lie detectors for employment purposes. The Madison, Wisconsin Common Council and the Cincinnati, Ohio Civil Service Commission both passed resolutions in 1964 prohibiting such uses. Akron, Ohio and Shively, Kentucky adopted similar prohibitions in 1965.[123]

An alternative regulatory approach, advocated by polygraph experts like Reid and Inbau, is to set up licensing standards for polygraph examiners. Since lie detection is based entirely

on interpretation of test results by the examiner, the experts feel that by establishing minimum qualifications, such as a college degree and six months training, objections about reliability of the polygraph will disappear. Ten states -- Arkansas, Florida, Georgia, Illinois, Kentucky, Mississippi, New Mexico, North Dakota, Texas and Virginia -- have adopted some type of licensing procedure for polygraph operators.[124] The Illinois law is regarded by the experts as an appropriate model for other states.[125] Lee M. Burkey, nevertheless, points out that:

> it is doubtful that the act really upgrades the standards of examiners, for the mere possession of an academic degree does little, if anything, to qualify an operator unless the degrees are advanced ones in the physiological sciences.[126]

Moreover, some states like Illinois and Kentucky excuse operators who have been practicing for a specific period of time from fulfilling the standards. In Illinois anyone who was in business on or before April 1, 1963 is excused, while Kentucky exempts persons with five years of practice before the passage of the licensing law in 1962. New Mexico's statute requires only a high school diploma or its equivalent and the ability to pass an examination administered by the state Board of Polygraphers.[127]

Opponents of the polygraph fear that laws like these concede the reliability and legitimacy of the polygraph once these oper-

ating standards are met. For this reason the Moss Committee did not recommend that the federal government establish a set of qualifications for examiners. Licensing requirements do not necessarily concede the reliability of the polygraph, however, as illustrated by an Arkansas statute establishing such standards which explicitly states that "nothing in this Act shall be construed as permitting the results of truth examinations or polygraph examinations to be introduced as evidence in a court of criminal law."[128/]

Organized labor has been extremely active in attempting to control the polygraph. The 1968 Collective Bargaining Report of the AFL-CIO succinctly expressed labor's views on the subject by stating that "the only sure protection for the worker is not to gamble on the 'lie box' game."[129/] The Retail Clerks International Association opposes the polygraph "without reservation", maintaining that "it has no place in enlightened labor relations."[130/]

Labor used three approaches in its campaign to stop the use of polygraphs by employers. The first of these is legislative action. Lee Burkey credits the successful national campaign undertaken by the AFL-CIO to prohibit the use of lie detectors in labor relations with the passage of anti-polygraph laws by twelve states.[131/] Even Reid and Inbau state that it is the labor unions which "have induced several state legislatures to enact laws prohibiting or severely curtailing the use of

polygraphs in private industry."[132] Labor, of course, is also supporting the Ervin bills to ban the use of polygraphs for employment purposes at the federal level.

Arbitration proceedings are another approach used by labor to protect jobs from dependency on polygraph tests. The American Bar Association in 1965 reported that "it would be fair to say that the lie-detector has been rejected in the overwhelming majority of reported arbitration cases."[133] A law review commentator has noted that "it is in but one case out of 27 adjudicated that evidence of the result of a lie detector test or of a refusal to submit to such test was held sufficient by itself to justify a discharge."[134] These rulings have usually been based on the inaccuracy and unreliability of the polygraph. As one arbitrator held, "even with the employee's consent, the tests are not admissible as evidence because they have no probative value."[135]

The National Labor Relations Board has been particularly concerned about the use of the polygraph to discover the union sympathies of employees or to hinder union organizing and collective bargaining. In one case, a large Texas whiskey distributor had required that its employees take a lie detector test following a union request for recognition. Because of the tests, ten employees, nine of whom were union members, were fired after being labeled security risks. The trial examiner, upheld by the NLRB, ruled on the basis of the evidence that the firings were

discriminatory, and required the company to "reinstate the ten employees with back pay and to stop its interference with their legal right to form a union."[136]

A more direct type of action taken by labor unions is direct bargaining with management against the use of polygraphs. This is often necessary since, as the Maritime Trades Commission points out, "neither the courts nor arbitrators can be depended upon alone to prevent workers from being subjected to the indignity of the 'lie detector' test."[137] Whenever possible, therefore, unions have written clauses into their contracts to prohibit the polygraph testing of employees. One example of such a contract is the agreement between Retail Store Employees Union Local 1262, AFL-CIO, and the Grand Union Company. Article 28 of the contract states, "No employee covered by this agreement shall be required by any representative of the employer to be the subject of a polygraph test."[138] To reinforce this, some unions have instituted a system of fines for members who submit to polygraph tests.[139] All of these efforts are intended to free the worker from the economic coercion of the polygraph machine.

APPENDIX B: CASE STUDY OF NEW JERSEY

Of the various attempts to regulate polygraph testing, supposedly one of the strongest is the law in the state of New Jersey. In 1966 the state legislature enacted the following

criminal statute:

> Be it enacted by the Senate and General Assembly of the state of New Jersey:
> C.2A:170-90.1 1. Any person who as an employer shall influence, request, or require an employee to take or submit to a lie detector test as a condition of employment or continued employment is a disorderly person.
> 2. This act shall take effect immediately.

In New Jersey a disorderly person is subject to a fine of up to $1,000 or a jail sentence of up to one year in prison or both.

In 1961, 1964, and 1965 bills were introduced in the New Jersey legislature to prohibit employers from using polygraphs as a condition of employment or continued employment. The 1965 bill even included a clause declaring anyone who administered such test to be a disorderly person. All of these bills, however, died in committee.

On January 19, 1966, Assembly Bill No. 38 was introduced. This bill, which provided that any employer who shall "influence, request, or require" an employee to submit to a polygraph test, shall be guilty of a crime, was later passed and became law on June 17, 1966. On January 31, 1966 a bill identical to No. 38 except for its exclusion of the crucial word, "influence," had been introduced, but later died in committee.

How did the stronger bill survive opposition? Since there were no committee hearings held on any of the New Jersey anti-

polygraph bills and since the state of New Jersey does not keep records of legislative debates, it is difficult to fathom the intentions of the sponsors of Assembly Bill No. 38.

It is clear, however, that the bill was enacted with strong labor support. Assemblyman Lynch, who was one of the sponsors of the 1964 and 1965 bills is now an official with the New Jersey AFL-CIO. Furthermore, Frank R. Rando, Vice-President of Retail Store Employees Local 1262, stated in a letter to the authors of this Report that "the lobbyist from the political organization COPE, AFL-CIO, and ACTIVE BALLOT CLUB RETAIL CLERKS were responsible for designing this law (the current anti-polygraph law) to be passed by the legislature in Trenton."[140]

How do polygraphers and prosecutors regard the statute? According to Backster Associated, the New Jersey law was designed to prohibit "spot screening" of people already employed.[141] The Mercer County Prosecutor's Office, on the other hand, construes the law as prohibiting pre-employment polygraph screening. Nor, in the prosecutor's view, can an employer use any other sanction, such as a denial of promotion, demotion, or a fine, to induce an employee to take a polygraph test.[142]

Advocates of the polygraph claim that they have found compelling evidence that when states act in the polygraph field, the incidence of polygraphing declines markedly.[143] J. Kirk Barefoot, former president of the American Polygraph Association,

feels that New Jersey employers have been "intimidated by the law" into stopping their polygraph programs.[144] Polygraph opponents seem to agree at least in part. For example, the Retail Clerks International Association maintains that "this law [the New Jersey statute] has been very effective in our industry."[145]

Since there are no reported prosecutions under the statute, however, it is impossible to assess its real effectiveness. Indeed, given the strong economic motives of professional polygraphers to keep their machines in use and of employers to reduce employee theft it would not be unreasonable to conclude that the statute is not being effectively enforced.

In fact, there are some indications that polygraph testing by employers both on applicants and on employees continues today in the state of New Jersey. Barefoot concedes that "in the case of New Jersey, a few employers continue to administer pre-employment tests."[146] He adds that this is "on a strictly voluntary basis and not as a condition of employment."[147] Merely to assert, however, that the tests are "voluntary" does not foreclose the possibility that the law has been violated, since it provides that employers may not even "influence" or "request" that a test be taken.

The Retail Clerks International Association claims that some illegal polygraph testing still goes on in New Jersey. According to Frank R. Rando, Vice President of Local 1262,

"at times we receive a call where a small store owner would request his employees to take a lie detector test, when there is a shortage in his inventory."[148] Although no one is prosecuted, the law is apparently violated.

There are various ways for employers to circumvent the statute. Instead of firing a person for refusing to take the polygraph test, employers can use other sanctions such as denial of a promotion, demotion, or fine. In the opinion of the Mercer County Prosecutor's Office, such an action would also be illegal. Since this is not clear on the face of the statute, however, it is unlikely that injured persons would complain about their forced submission to the test. Furthermore, an employer could apply sanctions against a recalcitrant employee in a subtle manner so that the employee could not determine that he had been denied a promotion, demoted, or fined solely for his failure to take the test. In short, therefore, the statute while appearing to place a strict limitation on the use of polygraphs by employers, nevertheless presents many difficult problems of enforcement.

APPENDIX C: ORIGINS OF THE MODERN POLYGRAPH TECHNIQUE

The history of the polygraph machine begins in 1733 with the invention by Stephen Hales, an English physiologist and chemist, of a method of measuring arterial blood pressure.[149]

A mercury manometer, an instrument for recording the pressure of gases and vapors with floating pens, followed in the early nineteenth century.[150] This latter invention by Dr. J. M. Poiseville, a French scientist, was later synthesized with Hales' discovery by K. F. Ludwig, a noted German physiologist and professor of anatomy, into a machine which measured the velocity of the individual's flow of blood with floating pens.[151] The operation of the floating pens was refined and made more reliable in the late 1800's by K. Hurthle and Dr. Johann Pete Frank.[152] The present version of measuring blood pressure, the pressurized cuff, was invented in 1896 by Sciopione Riva Rocci, an Italian physiologist. He called his device the "sphygmomanometer."[153]

The pneumatic chest tube and galvanic skin response indicator are the other principle devices composing the modern polygraph machine. The precursor of the pneumatic chest tube, an instrument which records respiration, was a physiological device, called the "sypromoter," invented in the latter half of the nineteenth century by Dr. John Hutchinson. The galvanic skin response indicator, a device to determine the resistence of skin to electricity, was invented in 1791 by Luigi Galvani, an Italian physiologist.[154]

The concept of using a machine to judge truth and deception emerged in 1895 when Cesare Lombroso tried to determine the

truth of various statements of some criminal suspects by means of a "hydro sphygmograph." This machine, which measured blood pressure and pulse changes, had previously been in use for medical purposes.[155] Additional successful results were reported in 1915 by William Moulton Marston, a criminal lawyer. As a student of Hugo Munsterberg, who had suggested using physiological changes to detect lies, he experimented at Harvard University with the correlation between lying and changes in systolic blood pressure. A proposal was made during World War I by a National Research Council Committee to apply his method in counterintelligence work.[156] However, the idea was not pursued.

A year earlier, in 1914, Vittorio Benussi experimented with the use of a pneumatic chest tube to record changes in respiration. He concluded that when the length of inspiration was divided by the length of expiration, the ratio was greater before telling the truth than afterwards. Conversely, when one was lying, the ratio was greater after lying than before.[157] Benussi's work was continued in 1918 by Harold E. Burtt. Although he partially confirmed Benussi's results and improved his technique, he concluded that the respiratory method had less diagnostic value than the blood pressure technique.[158]

An instrument, which continuously recorded all three phenomena, blood pressure, pulse, and respiration, was created in 1921 by John A. Larson. An American police officer with

psychological training,[159] he was interested in developing a mechanical means of determining guilt or innocence, which would be more reliable than juries.[160] With his machine, which he called a polygraph, he conducted several experiments on criminal suspects and reported a high percentage of accuracy in his results. In 1926 his junior collaborator on the police force, Leonard Keeler, added a device to measure the galvanic skin response or electrodermal response to Larson's combination.[161] Another refinement was added in 1945 by John E. Reid, the director of one of the major modern polygraph companies, John E. Reid and Associates. Because it is possible for a subject to change his blood pressure by various muscular activity, he devised an instrument for recording muscular activity along with changes in blood pressure, pulse, respiration, and galvanic skin response.[162]

APPENDIX D: A NEW DEVELOPMENT IN POLYGRAPH TECHNOLOGY: THE "PSYCHOLOGICAL STRESS EVALUATOR."

In addition to the continued use of the standard polygraph machine described in this Report, a new polygraph technique - the "Psychological Stress Evaluator" - lends itself to even more controversial uses. The following description of "stress evaluation" is contained in a report on polygraphs recently prepared by the American Civil Liberties Union Privacy Committee, under the chairmanship of Alan Westin:

"In 1971, a Virginia firm called Dektor Counterintelligence and Security, Inc., run by ex-Army Intelligence officers, announced a new product, the Psychological Stress Evaluator (PSE-1). Called a 'polygraph which detects, measures, and displays psychological stress without the use of visible sensors,' the PSE is based on the principle that when a person is under stress, the FM modulation in his voice disappears, leaving only the AM modulation. The PSE-1 therefore records the voice of the subject and converts the sound patterns into a graphed representation measuring the disappearance of the FM modulation. A non-stressed voice shows up as wavy lines; a highly stressed response comes out on a straight line."

"PSE-1 sells for about $2000, or it can be rented. It is a small device, fitting into a regular sized attache case, in contrast to the near desk sized standard polygraph machine. The company's literature notes that it can be used 'either covertly, or with the subject's full knowledge.'"

"According to claims made by Dektor, PSE-1 does not depend on an individual knowing that he is being interrogated. Therefore, judgments about his truthfulness can be made on the basis of any verbal statements made by the subject, not merely 'yes' or 'no' answers to questions as in polygraphing. Because the AM-FM range that is measured by PSE-1 reproduces satisfactorily in recordings made from telephone conversations, radio,

and television, PSE-1 can be (and has been) used to make stree-truth judgments about persons on the basis of statements they make over the telephone, and tests that Dektor ran based on the TV program 'To Tell the Truth' proved (they allege) thoroughly reliable in distinguishing the truthful from the lying participants. (A local newspaper reporter who wrote a story on Dektor suggested that their device should be used to evaluate television speeches of the President and other Administration spokesmen on Vietnam; the Dektor men were not amused.) The scientific basis of the device is that the voice (e.g., the larynx mechanism) is less subject to volitional control than the breathing, pulse rate, and other functions measured by the standard polygraph."

"Though the PSE-1 device has been on the market less than a year, it has already been sold to companies doing employment screening and theft investigations (one Washington, D.C. department store, for example); to police departments (for checking out statements by suspects); and by a state reformatory (for use in selection of inmates for a work program). Dektor literature also says that it can be used by psychiatrists as an aid in distinguishing 'fact from fancy' in patient statements, and by physicians to help diagnose brain damage in new-born children, through analysis of the FM modulation in their cries."

"In the pre-employment screening situation, the PSE-1

device is used by having a job applicant talk about his life history, job qualifications, loyalty, etc., while the conversation is secretly recorded in another room. A person trained by using an instructor's manual and a 'taped course of instructions' then examines the graph that is produced and passes judgment on the stress-truth involved."

"Dektor personnel allege that regular polygraph operators who have examined and experimented with the PSE-1 device find it better, easier, less intrusive to the subjects, and far more reliable than the standard polygraph."

"The Committee is still gathering information about the PSE-1 instrument, its scientific foundations, the claims made about its successes, who is using it and how, and similar matters. The convenient and surreptitious nature of the instrument is such that it might well become one of the most widely used instruments in the business, governmental, and political world in the near future, and thus a careful analysis of its civil liberties implications is in order. . . ."

"The PSE-1 device is an instrument that purports to make 'scientific' judgments about the truthfulness of a job applicant, criminal suspect, etc. If it is used surreptitiously, the individual has no opportunity to give or withhold his consent to the use of the device. He, or his representative, would have no opportunity to explain, contest, or challenge the use and/or results of the device."[113/]

FOOTNOTES

1. Robert J. Ferguson Jr., The Scientific Informer (Springfield, Ill., Charles C. Thomas, 1971), 130. [hereinafter cited as Ferguson].

2. Ben A. Franklin, "Lie Detector's Use by Industry Rises; Rights Peril Feared," N.Y. Times, Nov. 21, 1971. One pattern of use is for companies to give their employees periodic tests ("Revaccinations"). several times a year, which might explain the difference between estimates for "tests" and "persons".

3. "Some people claim that the polygraph is not necessary--that a good background investigation will uncover the unfit. . . Before World War II, a field investigator could interview many neighbors who really knew the candidate, not only as a boy but also as a youth and young man. Today, with the high rates of population shift and population density, in-depth knowledge of one's neighbors is unknown in many parts of our country.

This is the main reason why--with the advent of a very fluid mobile, and unstable society--more and more law enforcement agencies, as well as business firms, are utilizing skill of polygraphists." Ferguson, 145.

4. Harmon and Arthur, "The Utilization of the Reid Polygraph by Attorneys and the Courts," 2 CRIM. L. REV. 12, 12-13 (1955).

5. AFL-CIO Trades Department, Transportation Institute, The People's Forum: The Privacy Battleground (1971), 8.

6. Fred P. Graham, "Lie Detector that Measures Stress in Voice is Gaining Favor," The Minneapolis Tribune, June 5, 1973, at 3A.

7. J. REID AND F. INBAU, TRUTH AND DECEPTION" THE POLYGRAPH ("LIE DETECTOR") TECHNIQUE, 10 (1966) [hereinafter cited as REID AND INBAU].

8. AFL-CIO Maritime Trades Department, The "Lie Detector:" Guilty Until "Proven" Innocent, 59, Feb. 12, 1970. [hereinafter cited as Maritime Trades].

9. Hearings on Use of Polygraphs as "Lie Detectors" by the Federal Government Before a Subcomm. of the House Govt. Operations Comm. 88th Cong. 2nd Sess., pt.1 at 18 (1964) [hereinafter cited as Hearings].

10. Lee, The Instrumental Detection of Deception 77, (1953) (instruction book by the captain of the Berkeley, Calif, Police Dept.)

11. REID AND INBAU 6.

12. Id. 13.

13. A. WESTIN, PRIVACY AND FREEDOM 133-34 (1967) [hereinafter cited as WESTIN].

14. REID AND INBAU 219.

15. Skolnick, "Scientific Theory and Scientific Evidence: An Analysis of Lie-Detection," 70 YALE L.J. 698 (Apr. 1961) [hereinafter cited as Skolnick].

16. Id.

17. Ferguson, 132, data form at 151-54.

18. J. Reid and F. Inbau, "The Lie Detector Technique: A Reliable and Valuable Investigative Aid," 50 A.B.A.J. 470 (May 1964).

19. Burke M. Smith, "The Polygraph," 226 SCIENTIFIC AMERICAN 25 (Jan. 1967).

20. "What Happens When Lie Detectors Are Wrong?" Advocate (Retail Clerks' Association).

21. Maritime Trades 47.

22. "The Truth About Lie Detectors," AFL-CIO AMERICAN FEDERALIST (November, 1964), 2.

23. WEBSTER'S NEW WORLD DICTIONARY, CONCISE EDITION (1962).

24. Hearings, pt. 3 at 290.

25. Skolnick, 699; WESTIN, 133-34.

26. Maritime Trades 28.

27. REID AND INBAU 50.

28. Id. 168.

29. Skolnick 700, quoting Floch, "Limitations of the Lie Detector," 40 CRIM. L.J. 651, 653 (1950).

30. Hearings, at 318.

31. Skolnick, 702.

32. Burke M. Smith, "The Polygraph," 226 SCIENTIFIC AMERICAN 24 (Jan. 1967).

33. Id. 28.

34. A.M.Menocal III and J.M. Williams, "Lie detectors in Private Employment. A Proposal for Balancing Interest," 33 GEO. WASH. L. REV. 4, 934 (Apr. 1965).

35. REID AND INBAU 202.

37. R.A. Sternback, L.A. Gustafson, and R.L. Colier, "Don't Trust the Lie Detector," 40 HARVARD BUSINESS REVIEW, No. 6, 133.

38. "The Polygraph Revisited," SUFFOLK LAW REVIEW.

39. FREUD, "ON THE UNCONSCIOUS," INTERNATIONAL COLLECTED PAPERS 109-110 (1959) quoted in Skolnick 725.

40. A.M.Menocal III and J.M. Williams, "Lie Detectors in Private Employment: a Proposal for Balancing Interest," 33 GEO. WASH. L. REV. 4, 935 (Apr. 1965).

41. Burke M. Smith, "The Polygraph," 226 SCIENTIFIC AMERICAN 24 (Jan. 1967).

42 Hearings, pt. 3 at 298.

43. REID AND INBAU 163.

44. Id. 166.

45. Id. 167.

46. F. Hovarth and J. Reid, "the Reliability of Polygraph Examiner Diagnosis of Truth and Deception," 62 J. CRIM.L.C. AND P.S.2, 281 (1971).

47. REID AND INBAU 235.

48. Lee Burkey, "Privacy, Property, and the Polygraph," 18 LAB. L.J. 2, 81, (Feb. 1967).

49. Pfaff, "The Polygraph: an Invaluable Judicial Aid," 50 A.B. A.J. 12, 1130 (Dec. 1964).

50. Hearings, pt. 1 at 2.

51. See Appendix A.

52. Asch, "Forming Impressions of Personality," 41 J. ABNORM. SOC. PHYCHOL. 258 (1946); Mensch, Wishner, Asch, "Forming Impressions of Personality" Further Evidence," 16 J. PERS. 188-91 (1947).

53. Skolnick, 714.

54. ARTHUR AND CAPUTO, INTERROGATION FOR INVESTIGATORS 214 (1959).

55. REID AND INBAU 234.

56. LIE DETECTION AND CRIMINAL INTERROGATION (1968).

57. J. Reid and F. Inbau, "The Lie Detector Technique: A Reliable and Valuable Investigative Aid," 50 A.B.A.J. 472 (May 1964).

58. NEW YORK STATE B. J. ( ), 570.

59. Burkey, "The Case Against the Polygraph," 51 A.B.A.J. 9, 856 (Sept. 1965).

60. Burkey, "Privacy, Property and the Polygraph," 18 LAB L.J. 81 (Feb. 1967).

61. J. Reid and F. Inbau, "The Lie Detector Technique: A Reliable and Valuable Investigative Aid," 50 A.B.A.J. 472 (May 1964).

62. Skolnick, 714.

63. Id. See also Ross, "The Value of Blood Tests as Evidence in Fraternity Cases," 71 HARV. L. REV. 466 (1958).

64. Skolnick, 715.

65. Id.

66. B. Gunn, "Polygraph : Hoax or Panacea?" 14 BUSINESS TOPICS 4, 49 (Autumn 1966).

67. J. Poling, "Invasion by Lie Detector, " 88 READERS DIGEST 529, 112 (May 1966).

68. Maritime Trades 147, Citing Hearings.

69. Hearings, pt. 3 at 434-36.

70. Maritime Trades 143.

71. H. Dearman and B. Smith, "Polygraph Study," Advocate (Retail Clerks' Association) (August 1963), 15.

72. Skolnick, 714.

73. WESTIN, 237.

74. G.O. Mueller, "The Law Relating to Police Interrogation Privileges and Limitations," in C.R. SOWLE (ed.), POLICE POWER AND INDIVIDUAL FREEDOM (Chicago 1963), 141.

75. WESTIN, 237-38.

76. A.M. Menocal III and J.M.Williams, "Lie Detectors in Private Employment: A Proposal for Balancing Interest," 33 GEO. WASH. L. REV. 4, 935 (Apr. 1965).

77. "Lie Detector Tests Are a Blight on Retailing," Advocate (Retail Clerks Association).

78. Quoted in "Use of Lie Detectors Labelled As Immoral," Advocate (Retail Clerks Association).

79. Maritime Trades 23.

80. Id. 129.

81. WESTIN, 238-39.

82. Quoted in Ben A. Franklin, "Lie Detectors' Use by Industry Rises: Rights Peril Feared," New York Times, Nov. 22, 1971.

83.Council of Polygraph Examiners, Newsletter (undated), 4 (on file with the American Civil Liberties Union).

84. Id. 4.

85. Id. 4.

86. J. Reid, "The Polygraph on the Witness Stand," 11.

87. CONG. REC., June 24, 1971 (remarks of Sen, Ervin). In Schmerber v. California, 384 U.S. 757, 764 (1966), the Supreme Court indicated in dicta that polygraph testing has a severe and undesirable impact on Fifth Amendment rights:

> To compel a person to submit to testing in which an effort will be made to determine his guilt or innocence on the basis of physiological response, whether willed or not, is to evoke the spirit and history of the Fifth Amendment.

88. Committee Report quoted in M.A. Coghill, "The Lie Detector in Employment," Industrial Relations Library, Key Issues Series No. 2 (Cornell Univ. July 1968), 13. [hereinafter cited as Coghill].

89.Quoted in "Lie Detector Tests Labelled as Immoral," Advocate (Retail Clerks Association).

90. Quoted in Franklin, supra.

91. Id.

92. AFL-CIO Trades Department, The Privacy Battleground (Transportation Institute 1971), 70-71.

93. Coghill, 13.

94. Quoted in Franklin, supra.

95. WESTIN, 239-40.

96. M. Markson, "A Re-examination of the Role of Lie Detectors in Labor Relations," 22 LAB. L. J. 405 (July 1971).

97. Boeche v. State, _____ N.W. 2d. _____,, cited in Maritime Trades, 133.

98. Kaminski v. State, _____So. 2d. _____, cited in Maritime Trades, 134.

99. See Menocal and Williams, supra, 33, GEO. WASH. L. REV. at 943.

100. See Franklin.

101.MAGOFFIN AND DUNCALF, ANCIENT AND MEDIEVAL HISTORY 467, (1959).

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103. Id.

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106. Id., quoted in Smith, 29.

107. Id.

108. Id., quoted in Coghill, 9.

109. Maritime Trades, 43.

110. Id. 43.

111. Id. 46.

112. Id.

113. Id. 85-6.

114. S. 1438, 92nd Cong., 2d Sess. (1971).

115. Id.

116. S. 2156, 92d Cong. 2d Sess. (1971).

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118. EEOC, "Brief Against Polygraphs as a Discriminatory Labor Practice," (on file with the Senate Const. Rights Subcomm.).

119. Romig, "The Status of Polygraph Legislation of the Fifty States," 3 POLICE 55 (Nov. 1971) [hereinafter cited as Romig].

120. Quoted in "Terms of California Lie Detector Law Are Clarified," Advocate (Retail Clerks Association).

121. Romig, 55-62.

122. Id.

123. Coghill, 4.

124. The Privacy Battleground, 9.

125, REID AND INBAU 236.

126. Burkey, "The Case Against the Polygraph," 51 A.B.A.J. 9, 856 (Sept. 1965).

127. Maritime Trades, 120-21.

128. Quoted in The Privacy Battleground, 10.

129. American Federationist (AFL-CIO) ( ), 8.

130. "Lie Detector Tests Are a Blight on Retailing," Advocate (Retail Clerk Association).

131. Quoted in The Privacy Battleground, 69.

132. REID AND INBAU 259.

133. See Coghill, "The Lie detector in Employment," Cornell Industrial and Labor Relations Library Key Issues Series 2, 5 (July 1968).

134. M. Markson, "A Re-examination of the Role of Lie Detectors in Labor Relations," 22 LAB. L. J. 7. 400 (July 1971).

135. See Coghill 6.

136. See "NLRB Hits Use of Lie Detector for Union Busting," Advocate (Retail Clerks Association).

137. Maritime Trades 117.

138. Contract between Retail Store Employees Union Local 1262, RCIA, AFL-CIO and the Grand Union Company, Article 28 (on file with the American Civil Liberties Union).

139. Conversation with James L. Huntley, Field Director, Active Ballot Club, Retail Clerks International Association, AFL-CIO, March 31, 1972.

140. Letter from Frank R. Rando, Vice President, Retail Store Employees Local 1262, RCIA, AFL-CIO, April 10, 1972 (on file with the American Civil Liberties Union).

141. Conversation with Mr. Henson of the Backster School of Lie Detection, April 10, 1972.

142. Conversation with Assistant Prosecutor, Mercer County New Jersey Prosecutor's Office, May 4, 1972.

143. Memo on file with Senate Const. Rights Subcomm.

144. Letter from J. Kirk Barefoot, former President, American Polygraph Association, May 3, 1972 (on file with the American Civil Liberties Union).

145. Letter from Frank R. Rando, Vice President Retail Store Employees Local 1262, RCIA, AFL-CIO, April 10, 1972 (on file with the American Civil Liberties Union).

146. Letter from J. Kirk Barefoot, former President, American Polygraph Association, May 2, 1972. (on file with the American Civil Liberties Union).

147. Id.

148. Letter from Frank R. Rando, Vice President, Retail Store Employees Local 1262, RCIA, AFL-CIO, April 10, 1972 (on file with the American Civil Liberties Union).

149. Maritime Trades 20.

150. Id. 20.

151. Id. 20.

152. Id. 20.

153. Id. 21.

154. Id. 22.

155. C. LOMBROSO, L'HOMME CRIMINEL 2, 336-46. (1895).

156. Burke M. Smith, "The Polygraph," 226 SCIENTIFIC AMERICAN 25 (Jan. 1967).

157. V. Benussi, "Die Atmungssymptome der Luge," 31 ARCH. GES. PSYCHOLOGIE 244 (1914).

158. H.E. Burtt, "A Pneumograph for Inspiration-Expiration Ratios," 15 PSYCHOL. BULL. 10, 235 (1918).

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160. REID AND INBAU 3.

161. L. Keeler, "A Method for Detecting Deception, 1 AMER. J. POLICE SCI. 1, 38 (1930).

162. REID AND IMBAU 3.

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[From the Congressional Record, Senate, Dec. 20, 1973]

A Bill To Protect Against Invasion of Privacy by Prohibiting Lie Detectors

S. 2836. A bill to protect the constitutional rights of citizens of the United States and to prevent unwarranted invasion of their privacy by prohibiting the use of the polygraph for certain purposes. Referred to the Committee on the Judiciary.

Mr. Ervin. Mr. President, on June 24, 1971, I introduced S. 2156, a bill to protect the American people against the invasion of their privacy through the use of the polygraph. Today I reintroduce this measure.

The technological era is not one of unmixed blessings. We can all take great pride in our American ingenuity which has made the United States the world's greatest industrial Nation. However, only recently have we awakened to the dangers of permitting expediency to dictate the course of our economic and social progress. Our great industrial and technological revolution has been not only at the expense of the quality of the air we breathe, but at the expense of the uniqueness and dignity of all of us as individuals.

I refer specifically to the trend to use this new technology to promote controversial behavioral science theories which are supposed to help us obtain and measure truth. One such theory which has found currency in the employment field is that if one can only acquire sufficient information in advance on an individual, then one can predict and control behavior, so "truth verification" devices have been developed. The most widely used device is the polygraph or so-called lie detector.

Increasingly, traditional employment practices are being abandoned in favor of polygraph examinations. This instrument is being used to determine the fitness of individuals for employment, for promotion, for dealing with security information, or to determine ethical misconduct or violations of personnel regulations. And they are being used despite the fact that there is no clear scientific proof that they prove anything or predict anything for employment purposes.

During a polygraph examination, it is common practice for the operator to probe into many personal details of an individual's life, unrelated to his employment. In fact, personal, controversial, or stimulating questions are deliberately asked in order to form a basis or "norm" for measuring reactions to "relevant" questions. Consequently, polygraph reports contain such personal information as how the subject thinks, how he behaves in his personal life, what he reads, what his conduct and attitudes are in sexual matters, how he relates to his parents and family; and what he dreams about.

As long as these machines are permitted in employment situations, they will be a perpetual danger to the freedom which is the most cherished by us all—our right to privacy.

The Constitution itself creates a right to privacy which is designed to assure that the minds and hearts of Americans remain free. The bulwark of this constitutional principle is the first amendment. The first amendment was designed to protect the sanctity of the individual's private thoughts and beliefs. It protects the individual's right to free exercise of conscience, his right to assemble to petition the Government for redress of grievances, his right to associate peaceably with others of like mind in pursuit of a common goal, his right to speak freely what he believes and his right to try to persuade others of the worth of his ideas.

The fourth amendment guarantees "the right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures." In addition to the privacy of one's home and personal effects, the privacy of his person—or bodily integrity—and even his private telephone conversations are protected by the fourth amendment. The fifth amendment guarantees that an individual shall not be forced to divulge private information which might incriminate him. It also protects individual privacy by preventing unwarranted governmental interference with the individual's person, personality, and property without due process of law.

The ninth amendment's reservation that "the enumeration in the Constitution of certain rights, shall not be construed to deny or disparage others retained by the people" clearly shows that the Founding Fathers contemplated that certain basic individual rights not specifically mentioned in the Constitution—such as privacy—should nevertheless be safe from governmental interference.

The Supreme Court has held many aspects of individual privacy to be constitutionally protected. In recognizing that "specific guarantees in the Bill of Rights have penumbras formed by emanations from those guarantees that help

give them life and substance" (*Griswold* v. *Connecticut*, 381 U.S. 479, 484), the Court has found that those penumbras protect the right to give and receive information, the right to family life and child rearing according to one's conscience, the right to marriage, the right to procreation, the right to contraception, and the right to abortion.

All Americans can testify to the power of those protections of the individual's rights. The Constitution assures these rights to all citizens whether their exercise is pleasing to Government or not. And by the same token, it assures the individual the converse of these rights: the right not to speak what he believes, whether his silence is pleasing to Government or not; and his right not to act, not to associate, not to assemble, whether his inaction is pleasing to Government or not.

During the study on privacy which the Constitutional Rights Subcommittee has been conducting, we found that the number and kinds of privacy invasions are limited only by the ingenuity of human beings and by their technical capacity for committing them. It is sometimes hard to find rhyme or reason to some actions. This is why the subject of privacy is a very difficult field in which to draft legislation to protect individual rights.

If I were forced to find one common denominator for all of these techniques and practices, I would say it is the effect they have on the individual's free exercise of his mind and his freedom to seek his own destiny.

Probably no instrument in modern time so lends itself to threats to constitutional guarantees of individual freedom as the polygraph or so-called lie detector. The threat of its use or the intimidation inherent in its use restricts free expression and communication of ideas, intrudes on an individual's subconscious thought, makes him fear to speak his thoughts freely, or compels him to speak against his will.

To my mind, the entire purpose of these machines is to invade a man's mind and find what lurks in the innermost part of his mental consciousness for reasons which have nothing to do with his ability to perform a job. If the right of privacy means anything at all, and if it is a right to be cherished in our society, it means that people should be entitled to have thoughts, hopes, desires, and dreams that are beyond the reach of a bureaucrat, an employer, or an electronic technician. This is something which enthusiasts for these machines do not seem to understand. They do not understand and they do not appreciate how important privacy is to each American, and as long as that lesson is not understood, we all will find our right to privacy constricted, if not abrogated entirely.

I propose this legislation to ban the use of the polygraph for employment purposes in the hopes that Congress will pause for a moment, step back, and take a long look at the issues involved in the unrestrained use of the polygraph. Legislation is necessary to bring some order and control to the practice.

Just what is a polygraph? Contrary to popular belief, it is not a "lie detector." Bells do not ring and lights do not flash automatically when a person lies or tries to deceive. A polygraph is a machine which records one's physical response against the statements he makes. A pneumatic tube is placed around the subject's chest, a blood pressure cuff around his upper arm, and sensors are attached to his palm or fingertips. The recording units track the subject's blood pressure and pulsations, his breathing patterns, and his galvanic skin responses on a continuous graph. The galvanic skin response or GSR is the amount of electric resistance in the skin which is affected by the subject's sweat gland activity.

The premise behind the use of the polygraph is the assumption that lying leads to conflict, conflict causes tension, this tension can be accurately recorded and measured by the polygraph, and the operator by studying these reactions can tell whether the subject is being deceptive or truthful. However, no regular relationship between lying and physical responses has yet been established.

What is recorded, therefore, is not the subject's veracity, but his physiological responses to the examiner's questions. The graphs recorded by the "lie detector" are worthless unless "interpreted" by the examiner.

In interpreting the results, the examiner makes personal judgments as to what may have produced a tension response. A tension response can be induced by fear, anxiety, love, hate, hostility, frustration, conflict, or physical discomfort as well as by guilt. A negative reaction can be caused by resentment at the impertinent questions being asked, but we must rely on the training of the examiner to decide whether the response indicates a lie. Furthermore, differences in heredity, environment, and background will influence an individual's mental, emotional, and motor behavior, further obscuring the reason for a tension reaction, or lack of reaction, during a polygraph examination.

Thus, the interpretation process is not the mechanical function which some would have us believe. The examiner interprets the recorded tension reactions based upon his subjective judgment concerning the subject's motivation, honesty, and reliability. Since another examiner can and frequently does reach an opposite conclusion after reviewing the same graph, this form of truth verification can hardly be called an exact science. In fact, I have likened it to 20th century witchcraft and I have seen no documentation to alter my view.

There are too many variables involved in polygraphy. There are too many subjective judgments required in polygraphy. Bear in mind that it is not the machine or some demonstrated scientific fact which determines that the subject is being deceptive. It is solely the examiner's interpretation of the readings. As such, the polygraph examination is quite different from the types of comparisons involved in fingerprint identification, ballistic tests, or even blood-alcohol tests. The late J. Edgar Hoover rejected the idea that the polygraph was a "lie detector" and declared that—

Ninety percent of the polygraph's usefulness depends on the careful evaluation of the results by experienced examiners.

And even then certain categories of individuals can fool the most experienced operators: the brazen liar or hardened criminal; the dull-witted or "supercool"; or a person with no cultural belief about right or wrong. At the same time, an innocent, honest, introspective, sensitive person might register "deceptive" reactions because he is nervous or hostile to the test.

Nevertheless, proponents of the polygraph have made extravagant claims as to its value as a test of deception in routine uses. Attempts at proving the reliability of the polygraph as a lie detector have not sustained the virtual infallibility claims by its proponents.

First of all, independent tests to verify polygraph determinations are susceptible to the same criticism as the polygraph test itself. Such verification generally consists of having a group of polygraph examiners independently review selected cases to determine if the examining operator was correct in his judgment. Whether running the actual polygraph test or reviewing test results, each operator brings with him his own set of values, interpretations and methods of arriving at his conclusions. Therefore, any such study more accurately measures the extent of agreement or consistency among examiners and not whether the judgments are correct. Unfortunately it is possible to be both consistent and wrong.

Despite this criticism, the accuracy rates established during independent verification studies do not sustain the use of the polygraph as a lie detector. In 1965 the Department of Defense established a joint services group on a coordinated R. & D. program of lie detection research to study the reliability of the polygraph chart as the sole basis for judging deception. Their preliminary findings released on August 28, 1968, indicated a "reliability" rate between 30 and 93 percent depending upon the type of polygraph examination reviewed. It is interesting to note that during this same period of time the number of polygraph examinations given by the Defense Department in criminal cases dropped from 5,626 in 1965 to 1,445 in 1967.

However, even a 99-percent accuracy figure is of little comfort to an individual falsely accused as a result of "failing" a polygraph test. I received a letter from an attorney in Seattle who described the unreliability of polygraphs in terms of his own personal experience.

I ask unanimous consent to have his letter printed at this point in the Record.

There being no objection, the letter was ordered to be printed in the Record, as follows:

SEATTLE, WASH.,
January 29, 1973.

Hon. SAM J. ERVIN,
U.S. Senate, Old Senate Office Building,
Washington, D.C.

DEAR SENATOR ERVIN: I happened to read in the January 13 issue of Business Week an article regarding preemployment screening with polygraphs, and I noted that you are sponsoring a bill to severely limit or prohibit the use of that device for screening job applicants. I would first like to applaud your efforts and indicate my strong support for the bill, and secondly, relate to you an experience I recently had which will perhaps explain my attitude.

First, I am an attorney practicing here in Seattle, Wash. A large part of my practice consists of representing people accused of crimes. In April of

1972, I was representing a young woman incarcerated in the city jail and charged with a felony. On April 15, her husband came into my office and asked if I might be going over to see his wife that afternoon. I indicated I hoped to, and he asked me if I would drop off some cigarettes for his wife. He tossed two sealed packages of cigarettes on my desk when I indicated I would do so. We talked for awhile about his wife's case and he opened one of the packs of cigarettes and smoked several cigarettes from it. Then he left.

After a bit, my partner came down to the office (it was Saturday) and asked what I was working on. We chatted briefly and he mentioned he was going over to the city jail later that afternoon. I asked him to check with me before he went as I might be going over also and we could walk over together.

During the course of the afternoon, I smoked two or three cigarettes from the open pack that my client's husband had brought in. The other pack remained on my desk, sealed. Later, my partner came back into my office and asked if I was ready to go to the jail. I told him I still had work to do and asked if he would drop the sealed pack of cigarettes off at the jail for my client. He said he would leave them with the matron for the woman, and I said that would be fine. He left them with the matron, and during a routine check of the package of cigarettes, the matron discovered there was a small balloon of heroin inside.

When my partner and I learned of this, we cooperated with the police detectives in every way we could, explaining exactly what had happened, and indicating the name and identity of the person who brought the cigarettes into our office. Then the prosecuting attorney told us he would have to ask us to take a lie-detector test and would have to ask us to stipulate that it could be used against us if we failed it. We agreed, requesting only that he stipulate that if we passed the polygraph, there would be no charges filed. This he said he couldn't do. My partner and I agreed to their conditions and he took the test that evening. I was scheduled to take it the next day.

While my law partner was taking the test, I became somewhat angry that they had required him to go through this, especially considering that he had practiced in this community for better than 20 years and his reputation for integrity and honesty was unimpeached. The next day I told the prosecutor that I would be more than happy to take their polygraph test and would stipulate that it be used against me if I failed it, but that they were going to have to stipulate that if I passed it there would be no charges filed. Again, they said they could not do that. I indicated to them that I knew they could do that because they had done that before with clients of mine, some of whom had long criminal records, and I thought that it was only fair that we be treated at least as well as they were willing to treat criminals with long records. They told me they couldn't do it, and I refused to take their test.

Later that day they offered me a nonstipulated test, pointing out that if I failed it, it couldn't hurt me or be used against me, and if I passed it, they made no promises that they wouldn't still file charges. I refused the nonstipulated test, and again told them the only kind of polygraph I would take was one where it was stipulated that if I failed it, it could be used against me and if I passed it, there would be no charges filed. Finally they agreed. I took the test, and the polygraph operator failed me. The following day I was charged with attempting to smuggle heroin into the City Jail.

It was at that point that I finally realized that the man who represents himself has a fool for a client, so I hired an attorney. He obtained the prosecutor's agreement to retest me, given the great disparity between the facts and the polygraph, on the single condition that they pick the operator to be used and that I stipulate that the exam could be introduced against me. They chose a man in New York City, Mr. Richard Arther, whom I paid a rather substantial sum of money to fly to Seattle and give me the second test. He did, and, like the first polygraph operator, failed me.

It is extremely difficult to explain to anyone the mental conflict that goes on inside a person's mind when he is told by a machine that he lied when he knows he was telling the absolute truth. The conflict becomes even clearer when a second polygraph man, presumably one of the best in the nation, tells him the same thing. I was fortunate in that the objective facts were highly inconsistent with the opinion of the polygraph operators.

You would understand that if an attorney wished to smuggle contraband to a client in the city jail, a very simple and absolutely fool-proof method exists: all he has to do is to go to the jail and ask to see his client to confer, and his client is brought to a small interview room where he can speak with his client in absolute privacy with no bars or other impediments separating them. Any small item of

contraband can be passed to the client in absolute safety as the clients are never searched by the jail personnel on the way back to their cell. Therefore, if an attorney wished to smuggle a balloon filled with heroin to a client, a simple and secure method for so doing exists. On the other hand, it is standard procedure to screen every item of clothing, food, cigarettes, etc. that they receive for jail inmates and so an attorney who gave cigarettes to a jail matron for a jail inmate, knowing there to be contraband inside the cigarettes, would know the chances of his being discovered and prosecuted were extremely high.

I asked my law partner to take the cigarettes to the jail, knowing full well that he was going to deliver them to the matron. Therefore, if I had known there was contraband in the cigarettes, I would have known that I was going to be discovered and prosecuted. Thus, you can see the absurd conflict between the objective facts as to how the cigarettes were delivered and what the polygraph operators said I knew at the time the cigarettes left my office. They said that I knew there was heroin in the cigarette pack.

To shorten this story somewhat, after 6½ months of waiting, my case was brought to trial and was tried for 6 days to a packed courtroom. The prosecutor was allowed by the court to introduce every shred of evidence that they could muster. I and my attorney had researched the polygraph and its operation and history with extreme thoroughness during the months intervening my being charged and the trial and were able to cross-examine the polygraph operators, one of whom you should remember is one of this country's most highly acclaimed operators, with such thoroughness that the inconsistencies and absurdities in the theories supporting the polygraph became crystal clear to everyone. These absurdities and inconsistencies were highlighted by our own case, which consisted of the objective facts surrounding the incident and an expert witness from the University of Washington Department of Physiopsychology, Dr. Hans Doerr.

Dr. Doerr is a professor in the University of Washington School of Medicine and is director of the school's physiopsychology laboratory. Physiopsychology, as you know, is the medical discipline that studies the relationship between psychology and physiology. In his research, Dr. Doerr uses 16 extremely sophisticated polygraphs to measure physiological changes which occur in conjunction with psychological changes. Even with all of these polygraphs hooked up together and working on one individual, and assisted by amplifiers, filters, and computers to analyze results, Dr. Doerr testified that only a fool would say he could determine whether or not a person was telling the truth or not.

After hearing all the evidence, the judge wasted little time in convicting my codefendant, the individual who had brought the cigarettes into my office, and acquitting me, indicating that there was not the slightest shred of evidence against me, including the polygraph. Since that time, the prosecutor's office has indicated to me that their confidence in the polygraph was so shaken by our defense in my case, that they have decided not to take polygraphs into consideration in deciding whether to file charges or not in the future; thus, it appears that in the future, others will not have to suffer as I did because of the pseudoscientific hocus pocus of the polygraph hucksters.

Another positive effect that my trial had was to educate people in this area in a rather classic confrontation between objective facts and the polygraph, that the polygraph is indeed fallible and can do a great deal of damage.

I might mention that Dr. Doerr has become so interested in the use of the polygraph as a lie detector, that he proposes to call a symposium of physiopsychologists from around the country in the near future to address themselves to just this question. I mention this because the product of this symposium might be of some use to you in gaining support for your bill.

I apologize for taking so much of your time, but would again like to indicate my support and offer my assistance. If I can be of help to you in any way whatsoever, please do not hesitate to let me know. Anything I can do to prevent or minimize the damage and heartache the polygraph might cause to others, I will do. Thank you for your time.

Sincerely yours,

ROGER W. JOHNSON.

Mr. ERVIN. Mr. President, quite apart from the unreliability of the polygraph are the questions of necessity in employment situations, due process rights, and basic fair play. Industrial use of the polygraph both for preemployment screening and for on-going surveillance of its work force has become more widespread. A report by the Maritime Trades published in 1970 indicates that:

Industrial firms which use the polygraph run the gamut of America's economy.

Many use polygraphs in an attempt to halt the theft of such State and federally regulated products as narcotics and alcohol—hence, drug and liquor manufacturers, hospitals and even doctors' offices, are frequent clients for polygraph agencies.

Businesses such as electronic and chemical companies, which produce expensive products and which are concerned about possible theft of material or industrial espionage, frequently employ "lie detector" firms or maintain their own staff of examiners.

Banks and investment firms, whose employees customarily handle large sums of money, have been among the more active users of polygraphs. So have mail-order houses, discount shops, clothing and shoe stores, a leading restaurant chain, tobacco stores, and supermarkets.

Use of polygraphs on a regular basis has been found among delivery companies and freight movers—where pilferage has been a common complaint for years. But the devices are found, as well, among copper refiners, steel producers, rubber manufacturers, food and oil processors, and meatpackers.

The American Polygraph Association estimates that one-fourth of all major corporations now use the polygraph with between 200,000 and 300,000 tests administered last year in the United States alone.

However, it remains to be shown that the use of polygraph tests actually "screens out potential thieves" or "keeps workers honest." The main value of the polygraph apparently is the psychological pressures it brings to bear upon an employee or applicant. Whether the machine actually works is irrelevant to whether the subject believes it works. That is why proponents of the polygraph are intent on preserving its image.

What is a prospective employee to do when confronted by a polygraph examination? If an employee refuses to submit to the test then he is automatically suspected of "hiding" something. If he submits he is faced with the burden of proving his "honesty" to the satisfaction of the examiner. What has happened to our cherished presumption of innocence?

For example, in a published decision of the NLRB in the Lone Star Co. and General Drivers, Warehousemen, and Helpers Local Union No. 968 case—No. 23–CA–1563, November 13, 1964—the following polygraph report was the basis for firing an employee.

Subject [Gailes] has many, many gripes. Stated that his pay was too low, that he had to do too much work. States that he does not know just how much he is making per hour. States that he does not like the idea of having to leave his COD payments in a box to be counted by someone else the next day because he is being shorted. Stated that every pay day there is some taken out of his check because of errors in COD payments. States that the only way the company has been good to him is that when he had an emergency they loaned him some money. This person seemed very unhappy with the company. This person has taken the test about five or six times. He does not show much response to the relevant questions. There could be reasons for this: (1) he is completely innocent and therefore is unconcerned; (2) he has taken the test so many times that it does not bother him to lie which could be the reason; (3) he is the type of person who, because of his environment, has learned or been taught that stealing was not wrong and that everything that a person can get and get away with is theirs. There (sic) it is possible that a combination of things, his lack of concern for the test, and his guiltless feelings over stealing. Could be the reason for his lack of concern. Consider him a security risk.

Obviously the polygraph examiner rejected out of hand the possibility that Gailes was "completely innocent" of stealing from the company despite the lack of any evidence to the contrary. In assessing the conclusions of the polygraph report, the trial examiner said:

Of course the most striking thing about this report is the admission that Gailes might be "completely innocent" of any wrongdoing. But if he was not innocent, what had he done? The report does not say and it does not even speculate on what Gailes "might possibly" have done. There is no evidence, however, that Lone Star inquired of Truth Verification which explanation—innocent or guilty—seemed more probable or that it asked what Gailes had done if the "completely innocent" explanation appeared the less likely of the two. Instead, Lone Star automatically accepted the concluding sentence "Consider him a security risk."

But the most disturbing statement in the Gailes report is that his failure to show "much response" to incriminating (relevant) questions may indicate "guilt" for in other reports too much response is said to indicate guilt. In short, it would

seem that employees were termed security risks equally for giving too little response or too much response to relevant questions.

Fortunately for Gailes—and nine other individuals who also "failed" their polygraph tests and were discharged—the trial examiner ordered the company to offer them "immediate and full reinstatement to their former or substantially equivalent positions without prejudice to their seniority or other rights and privileges" and full back pay.

However, a woman in Idaho was not as fortunate in her experience with a polygraph examination. She was fired from her job for refusing to submit to the test. Since then, in addition to being unable to find another job, she has also been denied unemployment insurance benefits because the State department of employment considers her refusal to take the test "insubordination" and "noncompliance" with company policy. In appealing the ruling denying her unemployment benefits on the basis of her "misconduct"—refusing to submit to the polygraph test—the woman wrote:

When I agreed to work at the store, I was faced with the choice of starvation or submission to the polygraph examination. I much prefer to work instead of being supported by the government. However, I refuse to be taken advantage of. When I began to work, I did not know the polygraph examination included questions personal and in many instances unrelated to employment. The test included giving the examiner an itemized list of my bills and expenses per month. It also included questioning work habits and ethics of other employees—a practice I consider highly unethical. There were also questions of a legal nature—have you ever written a bad check? Do you use marihuana or narcotics? Have you ever driven while drunk?

Of course, I was recommended for employment at the conclusion of the test; but having experienced a polygraph examination, I decided that starvation is better than submitting to personal probes of circumstances unrelated to employment. I feel it was demoralizing and a definite infringement of my rights. I believe an employee should not be coerced into giving personal information to an employer for the sake of being able to work for him.

After learning what the polygraph examination involved, I would have been exceedingly stupid to consent to another examination of this sort—especially under an implied accusation concerning a shortage of money in the store.

You determined that my unemployment is due to "having been discharged for misconduct in connection with the employment." Misconduct is defined in Webster's Dictionary as "improper or illegal conduct." I really can't understand how my refusal to publicize personal information can be construed as "improper conduct." I would think instead that being asked to reveal this information is "improper conduct."

I am angered that retaining a job requires the sacrifice of principles and a willingness to reveal personal information. It is especially disappointing that my employer should state that I was "an honest and dependable employee" and say that he found that I went out of my way to do a very good job in the store—and yet fire me.

The statement to which she referred was a recommendation given her by her immediate supervisor. He wrote:

She was released for refusing to take a polygraph examination. The examination is a company policy and if a person refuses to take it then [the company] will no longer let them continue employment.

[The woman] refused the exam because of personal principles and not because of dishonesty.

It is my personal opinion that [the woman] was an honest and dependable employee.

Mr. President, in my opinion, a law-abiding person seeking a job should not be coerced by means of a lie detector to reveal personal information against his will. I am not questioning the right of an employer to hire whomever he feels would be the best candidate for a position or to dismiss an employee for cause. However, traditional employment screening procedures provide companies with ample access to sources of information on individuals without sacrificing the constitutional rights of all employees or applicants because of the transgressions of a few.

If an individual chooses not to respond to reasonable questions in a traditional employment interview and to provide proper information to facilitate inquiries about himself, then, of course, he should not be hired. Business must be able to protect itself. Yet, in this, as in other areas, expediency must not be permitted

to negate the liberties of all Americans. Our rights should never be measured on a dollar-and-cents basis.

Recently I received a sampling of polygraph reports from the president of a large midwestern company which were intended to demonstrate how valuable the tests are in effective employee screening programs. In describing the results of the polygraph examinations he wrote:

In practically every one of these cases the man involved was, from appearances, most acceptable, and it was only after a revelation of his past history that we could make a valid decision about his possibilities as an employee.

You will notice that in all of these instances our decision was made on the evidence that the man himself gave. We did not condemn anyone because the machine or the examiner passed an opinion. The evidences here are based upon the statements made by the people being tested.

While these reports were sent to support the position that the polygraph was essential in employment, I submit that they may in fact show the opposite. If one discounts completely the evaluation of the examiner as to the subject's suitability or honesty, or the machine itself, the justification for its use evaporates.

Almost all of the case histories I received contained information pertaining to previous criminal activities. Many of the subjects had been arrested and convicted of varied offenses including glue sniffing, driving while intoxicated, selling drugs, rape, and armed robbery.

Several of the subjects had medical problems which would have prevented them from performing the duties of the position for which they were applying.

Some had poor work records.

Several had taken merchandise or money from previous employers.

A few were regular users of narcotics.

Since, in most instances such information is readily revealed and verified by traditional employment procedures, the polygraph is not essential in ferreting out this information.

Yet, these polygraph reports also contain a wealth of extraneous information unrelated to employment such as:

He was arrested once for sniffing glue at the age of 13 or 14 and remanded to his mother's custody.

The subject states that he had received a total of 50 cents in tips while working for [a company].

Subject has approximately $158 in fixed monthly bills of which $93 is his car payment. He just purchased his car last week and the first payment is due on October 20, 1972.

Subject was arrested in June 1971, he loaned his vehicle to an unlicensed drive (sic) who was involved in a car accident, released on bond. Charges dropped . . .

Subject stated that between the age of 12 and 15, he occasionally shoplifted magazines, candy bars.

Subject has approximately $268 in fixed monthly bills, all current. His wife is employed and has a monthly income of $450 gross.

At the age of 13, subject was kicked in the genitals (involved in a fight) which resulted in some swelling. Subject has never seen a doctor for this and states no residual problem.

If this information is irrelevant, why collect it Why report it? One answer is that irrelevant questions are required in order to establish reaction patterns for the relevant questions. However, I must admit that I can see no justification for this line of personal inquiry. It is scarcely compatible with the rights of privacy guaranteed our citizens.

And finally, what uses will be made of a polygraph report? In this computer age, every detail acquired from such investigations about a person's life, habits, attitudes, and beliefs can be made available in seconds. Therefore, it is more important than ever that the individual be assured that information conveyed about him be correct, current, and relevant to the decisions being made about him.

I was particularly disturbed to see that a carbon copy of one of the "confidential" reports I received was sent to a private detective agency. Who else receives the information from polygraph reports? Do polygraph companies pool their information? If the judgments and evaluations of the polygraph examiner is made part of an individual's personnel file, will it then find its way into credit files and the like?

These are not idle concerns. In view of the proliferation of the use of the polygraph, and other truth detection devices such as the psychological stress evaluator (PSE) and "wiggle seat," we should all be concerned about the use of machines which compel people to reveal their innermost thoughts about their most personal matters in order to obtain employment.

The legislatures of our land have begun to express themselves against the use of such machines. To a varying degree 13 States prohibit the use of polygraph tests in connection with application for employment or as a condition to continuation of employment. Of the remaining States, 15 required polygraph operators to be licensed.

In conclusion, Mr. President, I would add that the purpose of the bill I introduce today is to protect the privacy and first amendment rights of all Americans. While the bill would not affect law enforcement or State or local governments, it would prohibit the compelling of Americans to submit to polygraphs in order to obtain or to hold a job in the Federal Government or in industries whose activities affect interstate commerce. The wealth of considered opinion on the unreliability of lie detectors and the unfairness of permitting them to be used as a test of employment has persuaded me that the time has now come for Congress to express itself against their use.

I ask unanimous consent that the text of the bill be printed in the Record.

There being no objection, the bill was ordered to be printed in the Record as follows:

S. 2836

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. It shall be unlawful for any officer or employee of any executive department or agency or any individual acting under the authority of such officer and employee to do the following:

(a) to require or request, or to attempt to require or request, any officer or employee of the United States, or any individual applying for employment as an officer or employee of the United States, to take any polygraph test in connection with his services or duties as such officer or employee, or in connection with such individual's application for employment;

(b) to deny employment to any individual, or to discharge, discipline, or deny promotion to any officer or employee of the United States, or to threaten to commit any such act by reason of his refusal or failure to submit to such requirement or request.

SEC. 2. It shall be unlawful for any person engaged in any business or other activity in or affecting interstate commerce, or any individual acting under the authority of such person to do the following:

(a) to require or request, or to attempt to require or request any officer or employee employed by such person or any individual applying for employment in connection with such business or activity to take any polygraph test in connection with his services or duties or in connection with his application for employment.

(b) to deny employment to any individual, or to discharge, discipline, or deny promotion to any officer or employee employed in connection with such business or activity, or to threaten to commit such act by reason of his refusal or failure to submit to such requirement or request.

SEC. 3. Whoever willfully violates or willfully attempts to violate any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction, shall be punished by a fine not exceeding $1,000, or by imprisonment not exceeding 1 year, or by both such fine and imprisonment.

SEC. 4. (a) Whenever—

(1) any officer or employee of any executive department or any executive agency of the U.S. Government, or any person acting or purporting to act under his authority, or

(2) any commissioned officer as defined in section 101 of title 10, United States Code, or any member of the Armed Forces acting or purporting to act under his authority, or

(3) any person engaged in any business or other activity in or affecting interstate commerce, or any individual acting under the authority of such person, violates or threatens to violate any of the provisions of section 1 or 2 of this act, any employee or officer of the United States, or any person applying for employment in the executive branch of the U.S. Government, or any person seeking to

establish civil service status or eligibility for employment in the executive branch of the U.S. Government, or any individual applying for employment in connection with any business or activity engaged in or affecting interstate commerce, or any employee or officer employed by a person engaged in such business or activity, who is affected or aggrieved by the violation or threatened violation, may bring a civil action in his own behalf or in behalf of himself and others similarly situated, against the offending officer or employee or person in the U.S. District Court for the district in which the violation occurs or is threatened, or for the district in which the offending officer or person is found, or in the U.S. District Court for the District of Columbia, to prevent the threatened violation or to obtain redress against the consequences of the violation.

(b) Such U.S. District Court shall have jurisdiction to try and determine such civil action irrespective of the actuality or amount of pecuniary injury done or threatened, and without regard to whether the aggrieved party shall have exhausted any administrative remedies that may be provided by law, and to issue such restraining order, interlocutory injunction, permanent injunction, or mandatory injunction, or enter such other judgment or decree as may be necessary or appropriate to prevent the threatened violation, or to afford the plaintiff and others similarly situated complete relief against the consequences of the violation.

(c) With the written consent of any person affected or aggrieved by a violation or threatened violation of section 1 or 2 of this act, any employee organization may bring such action on behalf of such person, or may intervene in such action. For the purposes of this section, employee organizations shall be construed to include any brotherhood, council, federation, organization, union, or professional organization made up in whole or in part of employees and which has as one of its purposes dealing with departments, agencies, commissions, independent agencies of the United States, or with businesses and industries engaged in or affecting interstate commerce, concerning the conditions and terms of employment of such employees.

CONGRESSIONAL RECORD—PROCEEDINGS AND DEBATES OF THE 90TH CONGRESS, 2D SESS., WASHINGTON, THURSDAY, JUNE 13, 1968

Senate

S. 1035—EMPLOYEE PRIVACY AND 20TH CENTURY WITCHCRAFT: THE LIE DETECTOR

Mr. ERVIN. Mr. President, this morning the House Post Office and Civil Service Subcommittee began hearings on S. 1035, a bill to protect the constitutional rights of employees of the executive branch of the Government and to prohibit unwarranted governmental invasions of their privacy.

Mr. John Macy, chairman of the Civil Service Commission, told the House today what he tried to tell the Senate for 2 years, that there is no need for this legislation; that the Civil Service Commission and the departments and agencies can protect employees.

As this body overwhelmingly indicated when it passed S. 1035 by a vote of 79 to 4 on September 13, there is an urgent need for this bill, not next year, but today. Many injustices will remain even after this measure is enacted, but we should start by ending the specific practices prohibited in S. 1035.

Mr. President, it is clearly the duty of Congress to protect the liberties of these American citizens from the tyrannies of the executive branch. Members of the Senate fulfilled their responsibility without yielding to the blandishments of the administration and the sometimes illegal lobbying of representatives of individual agencies.

We can only hope now that Members of the other body will see that there is an opportunity to vote on S. 1035 before Congress adjourns.

One section of that bill makes it illegal to require or request, or attempt to require or request, any civilian employee or any person applying for employment in the executive branch "to take any polygraph test designed to elicit from him information concerning his personal relationship with any person connected with him by blood or marriage, or concerning his religious beliefs or practices, or concerning his attitude or conduct with respect to sexual matters." The Senate amended this to make certain exceptions for the two security agencies.

Last November, I explained the necessity for such a law in comments before the Greensboro, N.C., Bar Association. In view of Mr. Macy's testimony before

the House today on this subject, I ask unanimous consent to have printed in the Record at this point the text of my remarks.

[There being no objection, the address was ordered to be printed in the Record, as follows:]

ADDRESS BY U.S. SENATOR SAM J. ERVIN, JR., BEFORE THE GREENSBORO, N.C., BAR ASSOCIATION, NOVEMBER 16, 1967

TWENTIETH CENTURY WITCHCRAFT: THE LIE DETECTOR

I want to discuss with you tonight the constitutionality of the Federal Government's use of the polygraph on American citizens.

Throughout human history, from the dawn of civilization, men have sought to distinguish the real from the unreal, fact from fiction, truth from lies. As Cicero wrote "Our minds possess by nature an insatiable desire to know the truth."

It is to this end that men and societies have applied vast resources of intellect and strength to developing institutions and devices for divining the truth.

As lawyers, we are well aware of the ancient function of the jury to find the facts, to distinguish truth from untruth. And we know the dangers to a client's liberty of false evidence. We have seen the daily invention of new ingenious scientific and laboratory methods of judicial proof. So we are familiar with the laws of probability.

As citizens and as members of a profession which has a duty and obligation to pursue the truth and to facilitate other men's search for it, we have a special interest in some of the ways Federal officials seek truth.

The poet Keats said:

> "Beauty is truth, truth beauty,
> That is all—
> Ye know on earth, and all ye need to know."

But man's search for truth is not always beautiful. In some agencies of the Federal Government, and elsewhere, man's desire to know all the truth from employees and applicants can be downright ugly.

I want to read you some typical complaints from law-abiding Americans who have encountered this device.

Received from an applicant at the National Security Agency

"When I graduated from college in 1965, I applied at National Security Agency. I went to 2 days of testing, which apparently I passed because the interviewer seemed pleased and he told me that they could always find a place for someone with my type of degree.

"About 1 month later, I reported for a polygraph test at an office on Wisconsin Avenue in the District or just over the District line in Maryland. I talked with the polygraph operator, a young man around 25 years of age. He explained how the machine worked, etc. He ran through some of the questions before he attached the wires to me. Some of the questions I can remember are——

"'When was the first time you had sexual relations with a woman?'

"'How many times have you had sexual intercourse?'

"'Have you ever engaged in homosexual activities?'

"'Have you ever engaged in sexual activities with an animal?'

"'When was the first time you had intercourse with your wife?'

"'Did you have intercourse with her before you were married? How many times?'

"He also asked questions about my parents, Communist activities, etc. I remember that I thought this thing was pretty outrageous, but the operator assured me that he asked everybody the same questions and he has heard all the answers before, it just didn't mean a thing to him. I wondered how he could ever get away with asking a girl those kind of questions.

"When I was finished, I felt as though I had been in a 15-round championship boxing match. I felt exhausted. I made up my mind then and there that I wouldn't take the job even if they wanted me to take it. Also, I concluded that I would never again apply for a job with the Government, especially where they make you take one of these tests."

Received from a Foreign Service officer

"I am now a Foreign Service officer with the State Department and have been most favorably impressed with the Department's security measures.

"However, some years ago I was considered for employment by the CIA and in this connection had to take a polygraph test. I have never experienced a more humiliating situation, nor one which so totally violated both the legal and moral rights of the individual. In particular, I objected to the manner in which the person administering the test posed questions, drew subjective inferences and put my own moral beliefs up for justification. Suffice it to say that after a short time I was not a 'cooperative' subject, and the administrator said he couldn't make any sense from the polygraph and called in his superior, the deputy chief.

"The deputy chief began in patronizing, reassuring tones to convince me that all he wanted was that I tell the truth. I then made a statement to the effect that I had gone to a Quaker school in Philadelphia, that I had been brought up at home and in school with certain moral beliefs and principles, that I had come to Washington from my university at the invitation of the CIA to apply for a position, not to have my statements of a personal and serious nature questioned not only as to their truth but by implication as to their correctness, and that I strongly objected to the way this test was being administered.

"The deputy chief gave me a wise smile and leaning forward said, 'Would you prefer that we used the thumb screws?'(!) I was shocked at this type of reasoning, and responded that I hardly thought it was a question of either polygraph or the thumb screws.

"This incident almost ended the deep desire I had for service in the American Government, but fortunately I turned to the Foreign Service. But if it happened to me it must have happened and be happening to hundreds of other applicants for various Federal positions."

Received from the wife of an applicant at General Services Administration

Her husband applied to the General Services Administration for a position as Operating Engineer. General Services Administration advised him that there was such a position open in the Public Building Services of the National Security Agency at Fort Meade, Md. During an interview at the National Security Agency he was advised that the position required security clearance and was called upon to furnish normal security-type information about himself. He provided all papers and information required.

Her husband was then directed to report to the National Security Agency for a polygraph test.

Many questions were asked of him before the polygraph was applied. The questions were of such a nature that he became angry, incensed, and emotionally upset. He was in this state when the polygraph was actually applied.

None of the questions asked were concerned with his loyalty to the United States, his religious beliefs, or political affiliation. A number of questions asked pertained to his sex habits. Mr. ——— told his wife following the test that he felt too humiliated and so degraded by the questions and the manner in which they were placed by the operator that he didn't care whether or not he secured the position. He told his wife that if truth in answering the questions was the criteria he was fully confident he did pass the test. The polygraph operator told him at the end of testing that he, the operator, would determine the outcome of the test.

In an attempt to be 100-percent sure that an applicant or employee is not lying, officials of some agencies strap him to a lie-detector machine—a polygraph. They hook up wires and tubes to him, which are supposed to register his respiration, blood pressure, and pulse rate. Electrodes are attached to his hand to measure the "galvanic skin response"—the flow of electric current across his skin as sweating increases. When the subject is asked a series of questions, his physiological responses are recorded on a moving sheet of graph paper by three pens. This explains the name of this instrument, since "polygraph" was the Greek word for "many writings."

USE OF POLYGRAPHS INCREASING

This is no minor problem, for the use of the polygraph is increasing. From an investigative tool in law enforcement work, its use has been extended for other purposes into private and public employment. Although it was developed in 1921, only in the last 15 years have employers come to rely on the polygraph to test the honesty of employees already on the payroll. When labor unions began complaining that a man's failure to pass a polygraph was not a just cause for dismissal, many employers began using polygraphs to screen applicants instead, on the ground that these people had no way of challenging the instrument or the findings.

According to a recent estimate, approximately 3,000 polygraph operators are giving between 200,000 and 300,000 tests yearly in the United States.

In the Federal Government alone, a House Government Operations Subcommittee, under the chairmanship of John Moss, found that 19 agencies gave 19,000 lie-detector tests in 1963. These figures did not include around 9,000 tests administered by the Central Intelligence Agency and the National Security Agency.

Proponents of polygraphs justify their use because of some findings and assumptions that: lying leads to conflict; conflict causes fear and anxiety; this emotional and mental state causes physical changes that can be accurately recorded and measured by the polygraph; and the operator by studying these reactions, can tell whether the subject is being deceptive or truthful.

The truth of the matter is, as the House Government Operations Committee recently reported:

"There is no 'lie detector,' neither machine nor human. People have been deceived by a myth that a metal box can detect truth or falsehood."

NORTH CAROLINA RULING

The Supreme Court of North Carolina in *State* v. *Foye*, 254 N. C. 704 (1961), listed a number of reasons for failure of the courts in this country to accept lie-detector evidence as a reliable and accurate means of ascertaining truth or deception. It found these were overwhelming obstacles to acceptance of the polygraph, the court said, "notwithstanding its recognized utility in the field of discovery and investigation for uncovering clues and obtaining confessions."

In an article in the American Bar Association journal several years ago, Professors Inbau and Reid defended the use of the polygraph. They frankly admitted, however, that only about 20 percent of the individuals who hold themselves out as examiners possess the training and skill required for competency in this field.

The attempt to transfer this investigative aid of law enforcement to the field of job suitability screening raises serious due process questions.

In standard criminal investigation, the polygraph examiner sets up a control question, in which he measures the subjects "guilt" response to a pecadillo, usually from childhood. This establishes a level of susceptibility against which can be measured the subject's response to the question at issue, which is the commission of a specific crime. In job suitability screening, there is no question at issue. All the questions are control questions and, thus, the examiner is measuring general sensitivity rather than specific guilt.

This is one reason the polygraph is an inappropriate tool for general suitability appraisal. Job applicants who fail the polygraph test may not be more "guilty" than those who pass, but only more sensitive. "Nervous" responses are more likely to be given by sensitive introspective, vigorously honest persons. There is no correlation between these personality traits and the probability that the applicant might be corruptive. Some unreliable applicants might also give a "nervous" response, others not.

The whole process smacks of 20th century witchcraft. Does the flesh of the applicant burn when a hot iron is applied to it? When tightly bound and thrown into a pond, does the applicant sink or float? When strapped in a chair with electrodes and other gadgets attached, does the rate of respiration and blood pressure of the applicant rise? Does the salt of his pores induce increased electrical conductivity? Are we reduced to alchemy as a technique of screening applicants for highly sensitive positions in the Federal bureaucracy?

The burden of proof should be on those who assert the efficacy of polygraph in predicting the behavior of prospective Government employees.

There have been practically no efforts to compile this proof. Congressional hearings and reports as well as the professional literature on the subject show that there are neither statistics nor facts to prove the value of the polygraph in personnel work.

Nevertheless, even more sophisticated devices are being planned. For instance, we recently discovered that under Government research contract, primarily through the Defense Department funds, private companies have developed a lie detector in the form of an innocent looking office chair—"a wiggle seat." This, of course, is to get around all of those opponents who say an applicant's body and mind react when all those electrodes are attached to him.

An article in the Science News Letter describes this device: "When an individual is seated in the chair, the forces exerted by the pumping action of his heart are sensed, changed from mechanical to electrical energy, then broadcast to

remote recording instruments. An individual weighing less than 140 pounds will not generate a satisfactory signal. Since the chair so closely resembles an ordinary chair, the heart data can be obtained without the conscious knowledge of the subject."

A commercial brochure on the chair proclaims: "Nothing intrudes on the serenity of the setting. The patient does not see, much less 'wear' an electrode—straps and wires are prominent only by their absence. He or she remains fully clothed throughout the brief examination. * * * Mere hand contact with the arm electrodes is sufficient to obtain a good record. * * * A microphone in the dorsal position senses vibro- and phono-cardiographic information."

While the medical uses of such instruments can be of great value, their potential for denial of basic rights to unsuspecting applicants and employees cannot be overestimated.

Legislatures in six states and several city councils have already outlawed lie detectors in the employment relations; in some instances, unions have forced their elimination through collective bargaining.

FBI Director Hoover, fortunately for our security, does not use them for personnel work.

The Warren Commission report stated:

"* * * In evaluating the polygraph, due consideration must be given to the fact that a physiological response may be caused by factors other than deception, such as fear, anxiety, neurosis, dislike and other emotions. There are no valid statistics as to the reliability of the polygraph. * * *

Why then do administrators have such blind faith in these devices? In my opinion, it is directly related to the role of science and technology in our society—to the cult of "the expert." There is an increasing belief that anything scientific must be more reliable and rational than the judgment of men. Unfortunately, this is true not only of officials who favor the lie-detector machine; it is also true of the average person who is subjected to it. Officials have admitted that its greatest use is in scaring the individual into admitting his transgressions.

There is a growing belief that the machine can bridge that credibility gap which must exist wherever fallible men choose between truth and untruth.

But I submit that this gap is a risk which must be taken in a free society. We cannot afford to dismiss the human element in decisionmaking where basic liberties are at stake.

There are workable alternatives to lie detectors. At the disposal of the Federal Government is a great investigative apparatus for checking references, background, and qualification of applicants. Vast sums are spent training personnel specialists how to evaluate an individual's understanding of his role in an organization or agency.

Which brings me to the second point I want to make about the polygraphs.

Even if they could be proved 100 percent reliable and valid, there is no necessity for these infringements of freedom and invasions of privacy; but even if there were a necessity for them, I believe every citizen should answer with William Pitt:

"Necessity is the plea for every infringement of human liberty. It is the argument of tyrants; it is the creed of slaves."

Why should an applicant or employee have to describe his religious beliefs and practices? As long as his record shows that his conduct is socially and legally acceptable, why should he have to tell a prospective Federal employer about his sexual attitudes and conduct; or whether he loved his mother, or whether he fights with his wife?

Is there not a part of his personality, of his private life, which can and should be immune from governmental trespass?

By questionable means, we are perhaps seeking truthful answers to questions which should not be asked. I think we should ask ourselves whether, by sanctioning these privacy invasions, we are not trifling with the great constitutional truths which buttress our society. I believe we are.

Regrettably, it would appear that we have come far from the nature of the truths which we once thought important; but in the case of the polygraph, we have come not very far at all from the ancient methods of seeking the truth. It is not too far from the ancient trial of ordeal by fire or water to the concept of the "wiggle seat." Nor is there much difference between the polygraph and the old deception test used by the Indians. They thought that fear inhibited the

secretion of saliva. To test his credibility, an accused was given rice to chew. If he could spit it out he was considered innocent, but if it stuck to his gums he was judged guilty.

What do polygraph techniques do to the concepts underlying the fourth and fifth amendments? To the principles that there shall be no search and seizure without warrant, and that no man should be compelled to incriminate himself? Is there anything more destructive to our system of government than attempting to seize a man's innermost thoughts: compelling him to confess his beliefs, his religious practices, his every sin; requiring him to bare his soul to a machine in order to hold a job?

Hardened criminals are safeguarded in this area of the law, yet an applicant for Federal employment is not.

In the employment process, however, it is to the first amendment that this 20th-century witchcraft does the most violence. That amendment guarantees a citizen freedom from interference with his freedom of expression in his thoughts and beliefs. And it includes not only his right to express them but his right to keep silent about them. This is a crucial issue in a free society.

To condition a citizen's employment and his future job prospects on his submission to the pumping of his mind, his thoughts, and beliefs about personal matters unrelated to his duties, is to exercise a form of tyranny and control over his mind which is alien to a society of free men. It is to force conformity of his thought, speech and action to whatever subjective standards for conduct and thought might be held by a polygraph operator, or his company, or an agency official. It is to weaken the fabric of our entire society.

I submit that the Constitution can and does protect us from such incursions on our liberties.

EMPLOYMENT AS A PRIVILEGE

To say that employment is a privilege is to avoid the issue. For, as the Supreme Court has said, it does not matter whether or not there is a constitutional right to employment. The means and procedures employed by Government should not be arbitrary.

CONSENT

Nor does it help to reply that a person "consents" to such an invasion of his liberty. Where the full force of Government is behind the request, where he knows that great computer and data systems of Government will retain forever his refusal to reply, or his answers to the queries, there is no free consent.

CONFIDENTIALITY OF RECORDS

Proponents argue that the records are confidential. It is no secret that his employment records, with all of the medical and security data, follow a man throughout his career. They are officially transmitted through the subterranean passages of our complex bureaucracy.

It was to prevent the practice of such tyrannies on Federal employees that I introduced my bill, S. 1035.

This bill is premised on the belief that just because he goes to work for Government, the individual does not surrender his basic rights and liberties as a citizen. Nor does he surrender his right to a proper respect by his Government for his privacy and other rights. S. 1035 is designed to prohibit unwarranted governmental invasions of employee privacy and is sponsored by 55 Members of the Senate. I am happy to report that it was approved by the Senate on September 13 by a vote of 79 to 4.

Section (f) of S. 1035 makes it unlawful for any officer of any executive department or agency to require or request, or attempt to require or request, any civilian employee serving in the department or agency, or any person applying for employment in the executive branch of the U.S. Government "to take any polygraph test designed to elicit from him information concerning his personal relationship with any person connected with him by blood or marriage, or concerning his religious beliefs or practices, or concerning his attitude or conduct with respect to sexual matters."

This measure is now pending in a subcommittee of the House Post Office and Civil Service Committee under the chairmanship of Congressman David Henderson. I am hopeful that the Congress will enact it promptly.

It is time we put a rein on the Federal Government's use of 20th-century witchcraft to find the truth. It is time the Federal Government was told what truths it should be seeking.

Mr. ERVIN. Mr. President, I also ask unanimous consent to have printed in the Record three editorials in support of S. 1035, which appeared in the Wall Street Journal, the Charleston, S.C., News & Courier, and the New Orleans, La., Times-Picayune.

[There being no objection, the editorials were ordered to be printed in the Record, as follows:]

[From the Charleston (S.C.) News & Courier, June 2, 1968]

CIVIL SERVANTS' RIGHTS

As citizens of a free country, civil service workers have a right to freedom from harassment for unofficial reasons. We commend what we see reported as a "one-man crusade" undertaken by Senator Sam Ervin (Democrat, of North Carolina) against illegal and immoral pressures on Federal workers.

Senator Ervin says public employees are asked embarrassing questions for obscure reasons and plied with threats for failure to participate in savings bonds drives, community chest fund raisings, and similar undertakings.

In our own area we have seen the checkoff system applied to soldiers, sailors, and airmen when fund campaigns roll around. Some commands seem to attack the fund-raising problem in the same manner as generals planning a campaign against an enemy. Organization is inevitable if a campaign is to succeed, we do not doubt, but neither brass hats nor bureaucrats should get way with orders to subordinates on how much to give to charity.

[From the Wall Street Journal, May 15, 1968]

EVEN CRIMINALS HAVE IT BETTER

Although Senator Sam Ervin's "bill of rights" for Government employees, designed to protect them from violations of the rights and privacy enjoyed by other citizens, passed the Senate almost 8 months ago, the House shows few signs of taking the measure up.

Now there might be some excuse for this House inaction if offending Federal agencies, seeing the handwriting on the wall represented by the North Carolina Democrat's bill, had begun to improve those personnel practices the measure proposes to correct. However, many employees plainly still are at the mercy of what Senator Ervin terms callous decisions and techniques.

For example, the bill would prohibit the coercion of Federal employees in U.S. savings bond campaigns and charity drives. No sooner had the Senate passed it than a new flood of complaints reached the Senate Constitutional Rights Subcommittee from employees and servicemen; they said they were being high pressured into bond-buying and charity contributions.

The bill also prohibits requests or requirements that employees back the nomination or election of anyone to public office through personal endeavor, financial contributions or any other thing of value. No sooner had it been passed than there was a new crop of complaints from employees that they were being intimidated by superiors to buy tickets to political dinners and similar functions.

Also, bureaucratic snooping in the form of psychiatric examinations, questions on employees' sex lives, religious beliefs and other personal matters unrelated to job requirements or performance is continuing.

More is at stake, as Senator Ervin observes, "than a correction of a few civil service practices affecting employee rights." The question is whether law will govern the basic rights of almost 3 million citizens and their families, or whether they must continue to depend on a tangled, conflicting mass of administrative rules, orders, and oral policy decisions.

Noting that at present Federal employees get fair treatment only at the discretion of supervisors, President Francis Speth of the American Federation of Government Employees observes that "due process is accorded as a matter of right to criminals whereas it is not so accorded" to Federal workers. When even criminals have it better, the Senate-passed "bill of rights" deserves something more than a House committee pigeonhole.

[From the New Orleans (La.) Times-Picayune, May 27, 1968]

"BIG BROTHER" IN PERSONAL LIVES

Agreement by the House Civil Service and Manpower Subcommittee to open hearings on a bill passed last year by the Senate to eliminate unwarranted Federal meddling into the private lives of Government employees and job applicants is welcome news. Less so is a report of proposed legislation, that allegedly would require "big brother" clearances for employees of private firms with Federal contracts.

Senator Sam Ervin (D-N.C.), sort of a one-man crusader in the field, and his Subcommittee on Constitutional Rights, gathered reams of testimony about Federal investigators' snooping into personal matters totally irrelevant to national security or the work of an agency.

Some examples cited before committeemen seem to betray a prurient interest into the sex life of personnel or applicants, while others are downright ridiculous. One question the Air Force assertedly poses to determine if some of its unskilled employees might qualify as carpenters, painters, plumbers or mechanics is: "Who is the composer of 'Madam Butterfly'?" Now really.

Then there were reports of investigators' quizzing secretarial aspirants on whether they believe in the second coming of Christ, what they dream about and things even more personal and embarrassing, one prober asked a neighbor of a man seeking a Federal job how the applicant treated his adopted children and it turned out neither the neighbor nor the youngsters knew they were adopted.

The committeemen heard other reports of subtle threats that the personnel files would list as unpatriotic those (including some war veterans) who refused to join in savings bond drives. Seems a strong "bill of rights" for Federal employees—and maybe now for workers of firms under Government contract—is needed to protect the freedom of the individual and right of privacy.

PREPARED STATEMENT OF ROBERT E. SMITH,
ASSOCIATE DIRECTOR,
PROJECT ON PRIVACY AND DATA COLLECTION,
AMERICAN CIVIL LIBERTIES UNION FOUNDATION

Through the years man has had an insatiable desire to determine who is lying and who is telling the truth. In this eternal quest for truth, man has consulted the Delphic oracle, gazed into crystal balls, and constructed a polygraph machine. The polygraph machine, used as a "lie detector," has become the center of serious controversy. This controversy ultimately revolves around the device's scientific validity and its effect on individual liberties.

There is a substantial dispute over the reliability of polygraphs. The qualifications and objectivity of those administering polygraph tests are highly questionable. But, accuracy aside, the polygraph should not be used because it infringes on essential individual liberties.

The American Civil Liberties Union Foundation, in its concern for the Bill of Rights, seeks to protect the privacy of citizens who are the subject of law enforcement investigations, who are employed in the public sector or who are exercising First Amendment rights, or who are simply subjects of the increasing numbers of computerized personal records compiled and maintained by both private industry and government. More than a year ago, the ACLU Foundation established a privacy project in Washington to monitor increased personal data collection - the methods used to gather that information, the storage of that information, and its dissemination.

It is our belief that no person should be required, by moral or legal compulsion, to submit to a "lie detector" test. There is a lack of qualified experts to administer tests and there are few, if any, objective and fair testing situations. Many persons are tempermentally unsuited to the test and an habitual or pathological liar can "beat" the machine. But even if the device were regarded as totally reliable, we would still oppose the use of polygraphs, just as we oppose the use of wiretaps. Polygraph testing, like the use of electronic surveillance, infringes on several Constitutional guarantees, including one's right to privacy.

For a person to decline to subject himself to a polygraph test should not be considered evidence of guilt, nor of concealment. The findings of the polygraph should not be admitted into evidence in court. (On this, just about every court is in agreement.) A polygraph test, when offered on a supposedly voluntary basis to a large number of persons, is still essentially compulsory and therefore improper. The use of the polygraph should be prohibited at all levels as a condition of employment in both the public and private sectors.

This statement's intent is to review briefly the constitutional arguments against the use of "truth verification" devices,

to provide examples of individuals who have been victimized by unreliable testing, to mention new verification devices now available and to raise the possibility that these devices may be linked up with each other or with recently developed computer hardware - all to the detriment of the individual's dignity and constitutional rights.

Constitutional Arguments

Europeans have long rejected the polygraph as an impermissible police technique, not so much because of its possibilities for error, but because it was thought to violate the essential dignity of a human personality and the individuality of a citizen. Polygraph testing seeks to penetrate the inner domain of individual belief, thereby infringing on First Amendment rights of free expression. One's beliefs, as opposed to one's conduct, have long been inviolate against inquiry by the government.

The polygraph test seeks to compel an individual to disclose information about himself despite the guarantees of the Fifth Amendment to the Constitution which provides the right against self incrimination. Damaging personal information which one normally would not reveal is exposed. This results from the coercive and programmed nature of the questions and from the subject's defensive willingness to elaborate on his answers. No polygraph test is truly voluntary. A person is faced with the alternative of not being employed, or being fired, or not receiving a security clearance. A criminal suspect is told that confession will do him good, or that the machine can prove his innocence. Use of such involuntary statements violates the Fifth Amendment.

The Sixth Amendment assures the right to confront one's accuser. Since the polygraph is a machine, it cannot very well be cross-examined, and this is one of the key reasons for its inadmissability in courts. Beyond that, results of pre-employment screening are frequently pooled and widely circulated in computerized systems of employment and credit information systems. As a result, polygraph test results can be used repeatedly and long after the test is administered, without the subject's knowledge. Not only can polygraph results now go beyond the control of the subject, but also far beyond the control of the party administering the test.

The use of a polygraph arguably constitutes an unreasonable search under the Fourth Amendment when an examination investigates a person in a deeply probing manner through a wide range of questions, and an unreasonable seizure under the Fourth Amendment when it takes and reveals to third parties the private thoughts of the subject.

Various constitutional guarantees create a right to privacy, as well. An individual's sense of personal autonomy and reserve - and thereby his personal privacy - is lost when he must place his innermost thoughts at the mercy of a large black box with moving stylus, simply in order to work for a corporation or for a government agency. Polygraph testing forces an employee to trade his privacy for a security clearance, a promotion, or the trust of his supervisors.

Individual Cases

A few examples will show that administering a polygraph test is a subtle, fragile business indeed.

> Within seven hours of a tragic apartment house fire last November, Los Angeles police picked up an 18-year-old transient youth with a record of setting

fires back home in Arizona. The youth was confused since he'd arrived in Los Angeles by bus hours earlier and, because of his prior history of arson, he could not be totally sure himself whether he was subconsciously responsible for the apartment house blaze, even though he recalled being elsewhere at the time. Without benefit of attorney the young man agreed to a polygraph test.

Police wrongfully planted on the suspect a pack of matches, and falsely told him during the course of the polygraph interrogation that the smell of smoke had been found on his clothing. After the obligatory warm-up questions to convince the subject of the machine's infallibility, the subject was told by the interrogator, "I won't have any trouble reading your charts." So it went for hours of repititious questioning, without food and without sleep. Confused about just what was the truth and exhausted, the youth eventually told the examiner what he wanted to hear.

Only ten weeks later did a defense attorney and an assistant district attorney substantiate the youth's alibi and win his complete exoneration and release.[1]

* * *

Last September, police took into custody an 18-year-old boy who found the battered body of his mother in their home in Canaan, Conn. Without benefit of attorney, the youth agreed to a polygraph test. After the obligatory card test in which the subject is asked to deliberately lie in order to test the reliability of the machine, the operator checked the polygraph and told the youth that he was "a textbook reactor. You're such a good reactor I started to laugh...we'll have no problems."

The dialogue continued:

Polygraph operator: "Pete, I think you got a problem. I really do. We go strictly by the charts. These charts say you hurt your mother."

Suspect: "The thing is, I don't remember it."

Polygraph operator: "The charts don't say that."

Suspect: "Would that show you what I'm actually thinking right now?"

Polygraph operator: "That shows me from your heart that you hurt your mother last night. How, I don't know."

Suspect: "I don't know either."

The interview continued as the youth became exhausted and hungry, also convinced by the operator that the killing of his mother was either accidental or excusable.

Polygraph operator: "Once we get this out you're going to eat like you've never eaten before. You tell me how you think it happened..."

Polygraph operator: "Once you get this out you'll be able to sleep for a week. Because your conscience will be free..."

Eventually, with the prompting of the polygraph operator, the youth described the beating of his mother. Testimony based on the polygraph investigation, which was tape-recorded, resulted in the conviction of the youth this year. He has appealed the jury's verdict on the grounds that his confession was coerced and unsubstantiated by other evidence.

* * *

A young bartender called the ACLU Privacy Project last week to report that he and two colleagues were fired from a fashionable tavern in Washington D.C. for refusing to submit to a polygraph test. Such tests are routinely administered now to employees of drugstores, retail stores, bars and restaurants, banks, brokerage houses, and, of course, agencies of the federal government.

* * *

A Maryland woman reported to the Privacy Project that all of the employees of a small retail store where she was employed were required to submit to polygraph tests after the owner became concerned about pilferage. She claimed that she had been threatened by the person responsible for the losses and therefore "flunked" the polygraph test and was fired. Complaints about employers' use of polygraphs are the second most common source of complaints to the ACLU Privacy Project. (The most common complaint involves demands for one's Social Security number.)

* * *

An Ohio woman complained to the ACLU of Cleveland that as a condition of employment with a retail chain store she, and others, were required to sign a statement which said, in part, "In the event of an unexplained shortage, I agree that if requested by the Company, I will take a polygraph test administered by the Truth Verification Agency regularly engaged by the Company. I agree to be bound by the report of such test and, if such report states that I am personally responsible for all or part of the shortage, I agree that the Company may apply against the shortage any monies otherwise due me, up to the minimum amount that such report states I am personally responsible for. If I refuse to take such test, I agree that the Company may apply against the shortage any monies otherwise due me up to the full amount of the shortage."

* * *

The President of the United States has been reported as telling Egil Krogh Jr., the head of the "plumbers" unit in the White House to stop news leaks, in August 1971, "I want every son of a bitch in the State Department polygraphed until you find the guy....It's more important to find the source of these leaks rather than to worry about the civil rights of some bureaucrats." A person with first-hand knowledge of the Nixon-Krogh conversation told the New York Times, "Nixon wanted to polygraph everybody; he wanted more polygraphing than there were machines available." The plumbers immediately began coordinating a series

of polygraph tests administered by security officials in the Department of State, Department of Defense and the Central Intelligence Agency.[3]

The New Technology

These examples could be considered "first-generation" polygraph problems. Consider the possibility, a very real one now, that the results of a polygraph test could be transmitted long distances away from the site of the test, while it was being conducted. Or the possibility that polygraph results can be computerized and stored for later retrieval, instantaneously or from long distances by remote terminals. Polygraph test results, like wiretap transcripts, will take on a life of their own. They will be computerized. They will be shared by many who have no need to know. They will be must reading.

A characteristic of "the first generation" polygraphing is that it is done with the knowledge of the subject. This is no longer necessary under the new technology.

The psychological stress evaluator (PSE), developed by Dektor Counterintelligence and Security, Inc., of Springfield, Va., is a portable "truth verification" device that may be administered without the subject's knowledge because it requires no physical contact with the individual. The lie-detector relies on respiration, blood pressure, and galvanic skin reponse on the assumption that untruths cause conflict that is reflected in measurable physiological change. The psychological stress evaluator relies on voice analysis, on the principle that when a person is under stress the FM modulation in his voice disappears, leaving only the AM modulation. The PSE therefore records the voice of the subject and converts the sound patterns onto a graph measuring disappearance of the FM modulation. Allegedly, it may work on a broadcast or tape-recorded voice. No experimental data have been made available on this device, but publicity in the popular press claims a validity for this technique in investigations in which the principals are dead (the Kennedy assassination, for example) or in determining truthfulness over radio or television (the Senate Watergate hearings, for example). Decision Control Inc., manufacturers of a second instrument using much the same principle, claims that voice analysis is as reliable as polygraph testing, basing its conclusion on a test involving only three subjects.

In spite of this, the PSE is gaining popularity among employers, law enforcement agencies, and psychiatrists and psychologists. The Pennsylvania ACLU has succesfully opposed plans by local police in that state to purchase PSE's for interrogation, and other ACLU affiliates are following suit. Following ACLU publicity in Philadelphia, for example, the City Council turned down a request by the district attorney to authorize purchase of a psychological stress evaluator.

The ACLU objections to the polygraph apply equally to voice analysis devices, with the additional concerns that these machines are conveniently portable and may be administered surreptitiously.

A Fordham University study of voice analyzers completed in August 1973 under contract for the U.S. Army Land Warfare Laboratory reported: "Essentially the findings indicated the clear inferiority of voice analysis, in its present state of development, not only to the polygraph, but also to judgments made on the basis of simply observing subjects' behavior."

The increased use of voice analyzers, especially in this embryonic stage of their development, deserves the immediate attention of this committee.

Voice analyzers allegedly may be used on telephone voices or recorded conversations. We have reached the point where the government snoopers' two favorite devices, "truth verification" machines and wiretaps, may now be combined. With increased government use of voice analyzers and electronic interception of telephone conversations, it is now possible not only to listen in to another's conversation and record it surreptitiously, but also to "verify" the truthfulness of what is said, also surreptitiously. The invasion of the individual's privacy is thereby compounded. The ACLU's experience with government surveillance tells us that these are no mere 1984 pipedreams.

There is more. The PSE may be outmoded itself. The Weizmann Institute of Rehovot, Israel, has developed a "microwave respiration monitor" to determine truthfulness remotely and without the knowledge of the subject. This device, presently being used in addition to the polygraph by the Israeli police, measures by use of microwave the palpitations of the stomach. The theory is that lying produces an increased rate of respiration which can be detected by increased movement of the stomach. The developers hope to market the device in the United States shortly. The device offers the possibility of widespread, random, remote and surreptitious "truth verification" at border crossings, airports, police line-ups, perhaps even Congressional hearings.

Now comes a professor at Kent State University in Ohio who claims to have discovered a lie detection technique that works on a subject who never opens his mouth. It works, too, on an intoxicated or drugged individual because it measures responses in the eye's retina to questions or comments. Dr. Frederick Davidson reports that he merely examines change in retina color, plus change in pupil size and in eye focus to determine emotional response to stimuli like questioning, Thus, he says, the conventional retinoscope can become a lie detector. The method was used temporarily to screen applicants for campus police jobs at Kent State.

Clearly the science of "truth verification" is moving towards camouflaging the instruments, as well as fortifying the claims of accuracy. All Americans should be alarmed by these developments. Among the issues that should be raised in the Committee's investigation are the following:

Will the mere existence of these devices create a chilling effect upon the population, making candid telephone conversations a thing of the past, making blandness (or professional lying) a prerequisite for government service?

Will citizens throughout this country make decisions about law enforcement and employment suitability or will the new technogy make those decisions for us?

What are the possibilities of link-up among these devices, with computers, or with other new hardware?

Will certification of professional polygraphers and the increased legalization of the devices create a "truth verification" monopoly?

Will professional certification assure that polygraph examiners are objective, dispassionate, or fair?

Isn't there an obligation on the part of the administrator of a test to determine truthfulness to tell the truth himself? Our research indicates that deception is part of the examiner's technique.

Is there a lesson to be drawn from the fact that these devices seem to originate in the military or intelligence community and are then foisted upon the civilian population?

To what extent are federal funds supporting research into lie detection devices and techniques?

There is no easy way to the truth. We believe with Senator Sam J. Ervin Jr., that "One of the most pernicious of all the pseudo-scientific intruments of the 20th Century is the polygraph or so-called lie detector. This machine is used by the government and private employers despite the fact that it has not been proven valid and reliable for these purposes.

"To my mind, these devices smack of 20th Century witchcraft and are more appropriate for a police state. They are unconstitutional means of obtaining the products of men's minds for employment purposes."

Thank you for the opportunity to appear before the Subcommittee today.

FOOTNOTES

1. "18-Year-Old's Ordeal, "Los Angeles Times, P. 1, Col. 1, March 24, 1974.

2. "Did Peter Reilly Murder His Mother?" New Times, P. 20, February 8, 1974.

3. "Nixon's Active Role on Plumbers," New York Times, P.1, Col. 6, December 10, 1973.

Mr. MOORHEAD. Mr. Smith, I do have some questions that I would like to submit to you in writing because of the strictures of time in these hearings. I presume that you would be willing to answer questions from members of the subcommittee submitted to you in writing?

Mr. SMITH. Yes, sir.

[The questions and answers follow:]

QUESTIONS FOR ROBERT E. SMITH

1. The American Polygraph Association cites the decisions in the cases of United States v. Ridling and United States v. Zeiger as proof of the fact that the courts hold polygraph test results to be admissible as evidence. What is the current status of admissibility of such tests as evidence, in State and Federal courts?

Answer. 1. To my knowledge only one court has ruled that polygraph tests are admissible evidence. That was the narrow ruling in U.S. v. Ridling, 350 F. Supp. 90 (E.D. Mich. 1972), in which a federal district court allowed the use of polygraph results by a defendant in a perjury case, with an examiner selected by the court. A year later, the Fifth Circuit Court of Appeals found Ridling unpersuasive in disallowing polygraph results in another case. U.S. v. Fragge, 476, F 2d 969 (5th Cir. 1973).

It is true that in U.S. v. Zeiger, 350 F. Supp. 685 (D.D.C. 1972), a district judge in the District of Columbia allowed polygraph results admitted into evidence in a prosecution for assault, but the decision was promptly reversed without opinion by the appellate court, U.S. v. Zeiger, 475 F 2d 1280 (D.C. Cir. 1972), on the basis of Frye v. U.S., 293 F. 1013 (D.C. Cir. 1923), which remains the controlling case on polygraph inadmissibility. The Ridling case hardly constitutes a trend. In fact, polygraph results were never introduced at trial because they were found to be inconclusive. For further analysis see "U.S. v. Ridling: The Polygraph breaks the 'Twilight Zone'" 23 Catholic Univ. Law Rev. 101 (1973), or "Problems Remaining for the 'Generally Accepted' Polygraph" 53 Boston Univ. Law Rev. 375 (March 1973).

2. You refer to an organization--Decision Control, Inc.--and its testing device, which has been used on three subjects. Is this organization the same as Technical Developments, Inc. (the proponents of the Mark II Voice Analyzer), which was represented at the hearings by Mr. Fred Fuller?

Answer. 2. Decision Control Inc., was cited on Page 4 of the report by Joseph Kubis on Voice Analysis, for the U.S. Army Land Warfare Laboratory, August 1973. DCI developed an early prototype for psychological stress analysis. (See Page 2 of the testimony before the committee by Fred Fuller.) DCI is now located at 300 Madison Avenue, New York, N.Y. 10017. Fred Fuller was associated with DCI when the voice analyzer was developed, but he is no longer with the firm. He is now President of Technical Development, Inc.

3. Please provide for the record copies of information concerning the "microwave respiration monitor" under development at the Weizeman Institute, Israel, and the device tested recently at Kent State University.

Insert 3. I am enclosing for the record copies of two articles describing the retinoscope technique for "lie detection" and a paper from the Weizmann Institute in Israel on the microwave respiration monitor developed there.

SIMON WINCHESTER on the lie detector world of Big Brother and Dan Dare

Spotting the truth in a bead of sweat

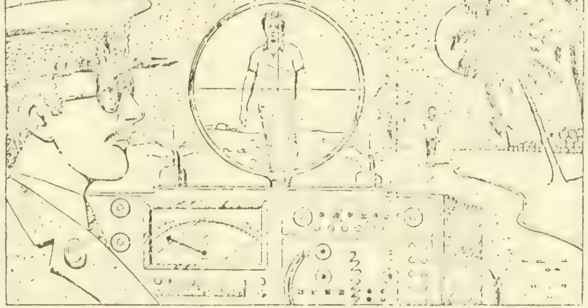
THIS WEEK 12 congressmen sitting on an obscure House subcommittee [illegible] have been hearing a tale that makes Dan Dare sound like medieval melodrama. They were told about a device now supposedly being tested in Israel on a small hill overlooking the Allenby Bridge, which [illegible] a man [illegible] — and in [illegible] that is nearly always an Arab — is telling the truth or not.

The machine is known as a "[illegible] microwave respiration [illegible] [illegible] and the men who [illegible] [illegible] [illegible] given [illegible] lawyers, with the American Civil Liberties Union, [illegible] on the [illegible] their device [illegible] Arab trying to walk [illegible] point [illegible] signal [illegible] his stomach tells [illegible] police [illegible] if he is [illegible] more rapidly under [illegible] than is [illegible] If he is, the [illegible] to the bridge [illegible] they suspect the man of telling lies and without further ceremony, the luckless Arab is brusquely turned away.

The device, says the ACLU "offers the possibility of widespread [illegible], remote, and [illegible] 'truth verification' at border crossings and [illegible] police line-ups, perhaps even Congressional hearings." Would that John Dean had known that.

The Israeli device, under development, according to the ACLU at the Weizmann Institute there, is only one of a darkly threatening battery of new devices that belong to the burgeoning crop of "crime fighting machines." Another is the truth verification mould being developed now in the laboratories at Kent State University in Ohio, an institution that might be thought to have a perfectly understandable fear of the crime fighting establishment.

The Kent State machine claims to be able to tell if a man is lying even if he doesn't open his mouth — if he so much as thinks a falsehood, that is apparently enough. It works by measuring the response to questions and comments of the human eye; it calibrates, continuously accurately, minute and momentary changes in the size of the pupil, retina, and the eye's external focus. It can tell if a drugged or drunk person is being truthful: it can probe behind the Fifth Amendment; it can drag a comment from a "no comment"; already men applying for jobs on the campus police force have been screened with the device, and so far, such is the state of what has been called the "security mania" currently sweeping America, no one has tried to put a halt to the procedure.



DRAWING BY DAVID [illegible]

The development of the lie detection industry has come under attack recently because of an increasing practice among employers to use polygraphs—as they are now popularly called—against potential employees. Often these days applicants are warned that a failure to subject oneself to a polygraph test will almost certainly be a bar to getting the job.

One department store in Cleveland takes the [illegible] the detectors even further: in the event of a shortage in a till, a warning [illegible] says [illegible] an employee's contract: "I agree to take a polygraph [illegible] by [illegible] Verification Agency [illegible] engaged by the company. If I refuse to take the test I agree that the company may apply against the shortage [illegible] moneys otherwise due to me."

In other words take the lie test, or have your wages cut to make up the loss in the till.

[illegible] lie detectors are just a small facet of the vast crime [illegible] industry. Many of the other products of this growing [illegible] were on display in mid April at the eighth annual Crime Countermeasures Conference held at the University of Kentucky, which [illegible] an interest in the field. Delegates came from every branch of the people-watching establishment — the CIA, the Secret Service, the Atomic Energy Commission, the FBI, with the Pentagon's Advanced Research Project Agency, and the army's Land Warfare Laboratory.

There were Britons there too — Mr [illegible] Hill of the Ministry of Defence, A. N. [illegible] of the Police Scientific Development [illegible] J. [illegible] of the Scientific Advisory Branch of the Home Office, R. Prewett of Plessey [illegible], Stanley [illegible] of Blackburn [illegible]. Together with delegates from South Africa and [illegible] Germany and Canada, Mr Hill and his [illegible] such contraptions as [illegible] detectors, [illegible] (Mr [illegible] presented a paper on Perimeter Intruder Detection Systems of Microwave [illegible] devices, automatic vehicle identification systems, and, perhaps the most [illegible] of all, a vast range of machinery coming under the title of "personal identity verification system," whose development is masterminded by the Electronic Systems Division of the US Air Force.

One such machine now in production — and, like so many similar systems first developed by the military under defence contracts, and now funnelled over for use against civilians—is the Identimat Automatic Fingerprint Recognition System developed by a British firm called [illegible] Products. "For truly [illegible] personal identification use an unspoofable, unforgeable characteristic of the person himself—his fingerprints," says the brochure.

At a "lower per-unit cost than [illegible]" the machine is a [illegible] which [illegible] [illegible] [illegible] central [illegible] computer— which may be many [illegible] — compares it with [illegible] from a central [illegible] [illegible] [illegible] and then decides whether or not to open the door. If it [illegible] [illegible] [illegible].

The possibilities [illegible] [illegible] [illegible] [illegible] are [illegible], both here and across the Atlantic, no [illegible] television [illegible] societies [illegible] to care [illegible] very much. The [illegible] through a [illegible] "Police State" seems all the [illegible] [illegible] the woman [illegible] through the crack. "It looks peaceful and safe in there."

Manchester Guardian June 4, 1977

Is The Polygraph Passé?

A Kent State University professor may have developed a new method to detect lies and gauge emotion by reading your brain.

by Ronald Kovach and William Lazarus

Dr. Frederick Davidson is sensitive about it. Maybe even hyper. He fears being dismissed as a charlatan, for after 10 years of research he thinks he has developed something extremely serious, a method of reading the brain. There is no extra-sensory perception involved. Neither are there stage tricks, legerdemain, mirrors, nor any other kind of flimflam.

A professor of psychology at Kent State University, Davidson has found that by merely shining a light into a person's eye, he can read what the subject is thinking without requiring a verbal response. Moreover, Davidson can determine the person's emotional attitude toward what is on his mind.

As a result of his work, Davidson exposed an FBI informant attempting to infiltrate the Kent State University campus police force in 1970. He has also been able to determine the exact moment of death of several persons, including his own dying mother.

His work may open a new science in the area of lie detection and communication along with implications for the fields of psychiatry and clinical psychology, especially in the areas of interviewing and education.

And, too, Davidson may have unlocked a Pandora's box of sinister applications. His work has been used to examine criminal suspects, police applicants, clients for a lawyer, dying patients and juvenile volunteers.

Davidson, 57, a balding ex-Marine—a real hard-nose, according to one colleague—joined the KSU faculty 27 years ago as an instructor of psychology. In 1963, he began his study of human perception: This winter he finally received his doctorate from Temple University in Philadelphia.

"I wasn't trying to brain-read at first," he says. "I was trying to duplicate previous experiments on children that showed that light shone into the eye reflected a different color when a subject perceived something." Seizing initially upon the color change in the eye, he experimented with subjects while illuminating their eyes in a darkened room with a retinoscope —the hand-held instrument that beams light into the eye for examination. The pupil, the round black dot in the center of the eye, is actually hollow and a light shone into it reflects back from the retina at the back of the eye.

Much to his surprise—he had no earlier hint—Davidson discovered that color changes in the retina indicated not only the degree of perception but also the subject's emotional response to an outside stimulus. Davidson determined that a red retina indicates an "emotionally-charged perception taking place" and white a "non-emotionally-charged perception." There are degrees of color in the eye, too, and he found, among others, yellow-gold which indicates "true disinterest." This color is occasionally seen, he says, when one is daydreaming, but is also present after death. He found that the color changes were often as rapid as one twenty-fourth of a second. As to why the colors are red and white and what is the physiological mechanism behind the color changes, Davidson is not sure. He says published reports that the colors result from changes in the tissue behind the retina are wrong. Instead, he thinks the colors result from biochemical changes in the rods and cones in the eye.

He also found two other measures that could be taken together with the color change to give him a very complex indication of emotional response: change in pupil size and change in focus. Davidson learned that focus changed with individual thought—from far-

PHOTOGRAPHY BY DIANA McNEES

the change in the angle at which the light was reflected back toward him, Davidson could see the focus change. He was able to tell if a subject did not know the answer to a question because the subject became farsighted—"like his eye was reaching into his mind for an answer."

Davidson says his methods of looking into the eye follow the dynamics of perception. "I'll catch the modifications in your mind before you ever get the words out to answer my question. With a criminal suspect, for instance, I can see that he has all his gears in motion before I even start to question him."

Retinal reactions tell Davidson how meaningful something is to a subject and whether it's important for the subject *not* to answer in a certain way. While a person can change his thinking, Davidson can catch the modification. He says he can see the motivational factor behind the response.

He put the results of his study to use when he was asked to interview applicants for openings on the Kent State University campus police force following the killing of four students, May 4, 1970, by Ohio National Guard. "The police needed more professional and sophisticated forms of testing," says campus police detective Robert Winkler. Winkler was directed by the then security chief Donald Schwartzmiller to develop a series of tests that would enable the police to be sure they hired what he termed the best applicants. One of the exams Davidson suggested was the retinoscope. During the program, about eight applicants were questioned by Davidson. He recommended that several be rejected.

Davidson notes that under questioning he realized that one of the

[illegible] thing
[illegible] ofessional life.
He had strong emotional reactions related to questions in that area. So I told him that I would not allow him to be hired." After that, the man admitted his FBI affiliation. Winkler reported that Davidson told him of the applicant's affiliation. The man severed the FBI link and worked as a dispatcher with the campus police for several months before leaving. The Cleveland office of the Federal Bureau of Investigation denies any knowledge of the incident.

Winkler said Davidson told him the results of the testing and passed on recommendations. According to Davidson, approvals were based on applicants' emotional stability and ability threshold against loss of personal control, and their personal deficiencies in financial, social, and intellectual areas. These findings were added to other test data—from a physical examination and I.Q., medical and endurance tests—before a decision was made on hiring.

Winkler claims the main thing the department wanted to know was whether or not an applicant was emotionally stable enough to hold up during extreme stress periods. He says Davidson only passed one applicant with "flying colors" and had some reservations about the others. The one who received the highest marks, however, was a better than average policeman.

Winkler says all applicants had to sign a legal form before they could undergo psychological testing. The questioning delved into their personal lives and the security was so restrictive that Winkler himself was not allowed to witness a session.

The program lasted four months and ended when Schwartzmiller was replaced by James Fyke who preferred other forms of testing. "We were very satisfied with the testing," says Chet Williams, KSU Safety Director and Schwartzmiller's boss. "With all the emotional stresses a policeman faces, how could we be sure he could stand the pressure? Would a guy hold up or wouldn't he? Davidson had shown us proof of his work and we wanted to see if it worked, and his procedure did detect some things. No question about it." Winkler says the findings were similar to those achieved by a polygraph. "We were quite proud of it. It set standards we never had before."

Ted Gersdorf was the second policeman hired by the police force who was tested by Davidson. He was one of three policemen added to the force after the May 4 shootings. He left the force in 1972. Now an insurance salesman, Gersdorf, 24, remembers the testing "very well." He was ushered into a small room about the size of an office, 10 feet by 10 feet. Davidson sat behind a desk, about eight feet away. Gersdorf was sitting in a chair, against the wall, facing him. The lights were turned off and Gersdorf was told to relax. "He shined this light—it looked like something doctors use to check ears—into my eyes and asked me general personal questions," Gersdorf relates. "He also asked me things like what I would do in law enforcement situations and my views on law enforcement. We talked for two and a half hours. It was a pretty long time." He says he was not impressed with the two-and-a-half-hour examination and thought Davidson was using the retinoscope as "a lever." "It was like a magic stick in his hand," Gersdorf says. "The story I had been told that it would tell if you were lying seemed so strange. But after a while, you started to believe the story. It might just work."

He says he had been cautioned to tell Davidson the truth before he went into the test and felt under pressure to tell the truth. "We were in a situation where you could say anything and everything because it was all in strict confidence. Besides, if you wanted the job, it wasn't worth lying for."

Davidson says Gersdorf misunderstood the process. "Fear of the process is not what makes what I do work. Everyone thinks I'm guessing. That is why I believe he didn't think of it realistically. Subjects don't realize what is going on as long as they think I'm guessing. They can answer any way they wish; it doesn't matter. I 'see' what's happening in the brain."

Davidson began his experiments after taking a leave of absence from Kent State to work on his doctorate in educational psychology at Temple. He received his Master's from Temple in 1946 and his A.B. from Allegheny College in Meadville, Pa., in 1939. He was aware that research by others, notably Dr. Arnold Gessell of the Yale Developmental Clinic, had shown that a child's retina changed colors in response to different stimuli. Gessell had also used the retino-

scope to examine his subjects' retinas. Initially, Davidson worked on duplicating Gessell's work by flashing figures and pictures on a screen 20 feet away from his subjects, who ranged in age from 10 to 60. He would also repeat a series of numbers to a subject, such as 1, 6, 11, and 16, and note the response in the retina while he asked the subject to tell him the relationship between numbers. He would then give a more difficult series of numbers such as 21, 88, 77, 92, and 83 and again note the oral and retinal response. Then he would ask such impersonal questions as "What is your grade point average?" and note the reaction in the retina.

It was during one of these sessions, Davidson recalls, that he asked a question and got a response that did not correlate to earlier findings. "The subject's retina turned a brilliant red," he says. "It shouldn't have happened like this. At first, I thought something was wrong with the retinoscope or the lighting." It was the first time Davidson thought he might be on to something. Later he realized the student had reacted because his question had touched on an emotionally charged topic."

Although he thought there was some significance to the color change, he had never read anything about it in the psychology literature. He spoke to ophthalmologists—medical doctors extensively trained in the eye—but they could not contribute anything to his findings. Meanwhile, he continued extensive testing in Kent. With the help of three professors, he designed a "giant retinoscope" and attached it to a 16 millimeter camera and began examining hundreds of volunteers, mostly his own students.

Following the 1963-68 period when he did his extensive experimentation, he was called in by the KSU campus police to question suspects accused of minor crimes. Most suspects cooperated when they learned what was involved. In 1968, the year he calls his turning point, he examined two suspects arrested by the Portage County Sheriff's Office. The same two were also examined with a polygraph. In the first case, Davidson's results were exactly the same as the polygraphs. In the second case, he was asked to question a suspect about a burglary, after Walter Kramer, the administrator of the Portage County Juvenile Court in Ravenna, used a polygraph on the teen-ager. After examining the burglary suspect, Kramer reported he had stolen, then sold, certain equipment and pocketed the cash. Davidson agreed that the suspect was a thief, but reported the suspect liked the equipment too much to sell it. "He has it stashed away." Davidson says the suspect looked at him and said in an awed tone, "My God, he's reading my mind." The goods were recovered the next day.

Kramer, trained as a polygraph operator, says that in 1968 he tested about 1,000 juvenile volunteers (some of whom were "troubled" youngsters) by polygraph while Davidson simultaneously interviewed them under his retinoscope. The purpose of the testing was to compare Davidson's accuracy with that of the polygraph. The questioning was of a personal nature.

"His method is superior," Kramer says, "because it shows degrees. It can tell confusion, embarrassment and downright lies—and the degree of each. It can tell whether your lying is protective or downright guilt. And it can be done with comfort. There is no pressure from electrodes as in the polygraph." (Davidson usually stands eight to 10 feet away from the subjects; doing so, he says,

"adds to rapport" with the subject.) A parent of one of the "troubled" youngsters who took part in the testing spoke to Davidson sometime afterwards and thanked him for helping to reveal her son's drug problem.

Davidson also interviewed two prospective clients in criminal cases for his own lawyer, who initially ridiculed the method. Davidson's object was not to tell the lawyer whether the clients were guilty or innocent, but whether they were telling the lawyer everything they knew pertaining to the cases. After the interviews, done in the presence of the lawyer as a legal precaution, Davidson asked for an evaluation. As the lawyer answered, Davidson said he would examine the lawyer's retina. The attorney—by then highly impressed with what he had seen—began by giving his personal opinion, which he was *sure* of. Then he began to discuss Davidson's procedure itself—which, in his mind, he really *wasn't* sure of. Davidson says he immediately detected a change in the attorney's retina—from white to a tinge of red, with a focus change indicating to him the shift to a new "idea." The attorney, Davidson says, admitted he had changed his viewpoint. Davidson is continuing to test clients for the lawyer. A Marine reservist, Davidson went to Washington in 1965 to convince Marine Corps officials that he could separate Viet Cong from South Vietnamese by a simple examination. "The officials treated me like an oddball," he says. They told him they needed time to evaluate his technique but wouldn't be able to deal with it for some time. He tried to interest the Corps again last June, but to no avail.

Davidson's most dramatic experience was in testing his dying mother, Helen S. Davidson, 80, who had entered Ravenna's Robinson

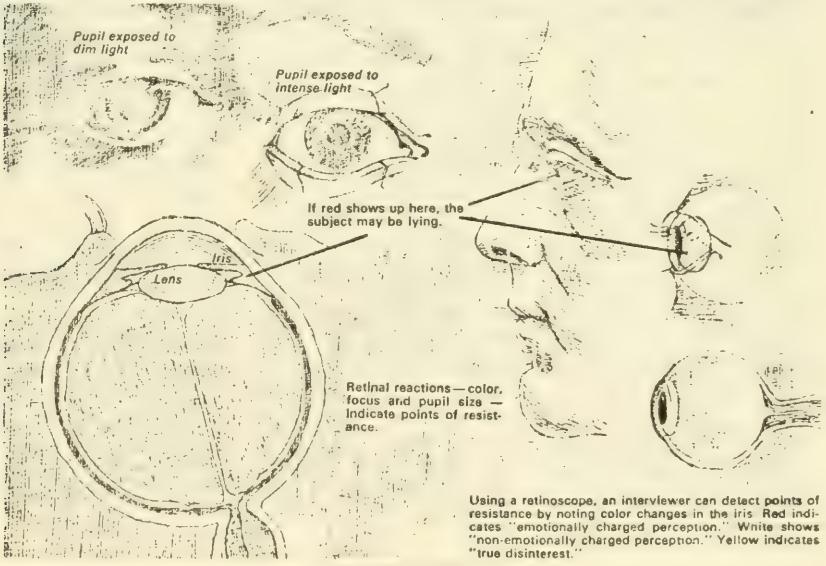
Points of Resistance and the Physiology of Lying

Dr. Frederick Davidson explains that the line of questioning he uses in his examinations is basically directed by detection of points of resistance that he discovers in a subject.

These points of resistance are indicated in the subject's retina by changes in color, focus and pupil size. For instance, a person can show resistance to questions concerning his job, if, perhaps, he has a poor attitude toward his work, or, a more blatant example, his marriage, if he has been unfaithful.

Davidson compares his interviewing technique to the spokes and hub of a wheel, with the hub being the point of resistance and the spokes the guide to further questioning. He simply continues to question in the area of resistance, moving further and further out along the spoke of the wheel until he discovers the meaning of the resistance.

It does not matter whether the subject is intoxicated or under the influence of drugs while Davidson questions him, since the subject's conscious state does not interfere with his retinal responses. Nor are oral responses to his questions needed. "I am reading changes in the retina," he says. "The retina is by definition an extension of the brain. What I am doing is brainreading. I am actually trying to indicate intellectual and ideational change." ■


Pupil exposed to dim light
Pupil exposed to intense light
If red shows up here, the subject may be lying.
Iris
Lens
Retinal reactions—color, focus and pupil size—indicate points of resistance.

Using a retinoscope, an interviewer can detect points of resistance by noting color changes in the iris. Red indicates "emotionally charged perception." White shows "non-emotionally charged perception." Yellow indicates "true disinterest."

ILLUSTRATION BY GREG PAUL

... Memorial Hospital in November 1968 and died there Jan. 1, 1969. "When she entered the hospital, it seemed obvious she wouldn't return to health," Davidson explains. "When she was fed orange juice or coffee, I could tell with the retinoscope whether she liked it by observing the changes in her retina. I was talking with her by questioning and observing the retinal response. I also examined her with the retinoscope after she became comatose, three days before her death. Prior to death, after unconsciousness, I noticed a constant redness in the retina that did not change. This redness stayed the same until her death."

Davidson's decision to examine his dying mother in her last minutes was an emotionally heartrending situation. "My mother for years wanted me to amount to something," he says. "From her broad readings, she would send me clippings of stories which might be of interest to a psychology professor. My justification was that my mother would help me right to the end, as she would have wished.

"I had little idea what kinds of changes I'd see when I examined her retina near the end. Thirty minutes before death, cyanosis was obvious (cyanosis is the blueish skin color caused by lack of oxygen in the blood). The purple color in her feet was moving up her legs." The nurses and others, with death imminent, had left the room. Mrs. Davidson, now with her unseeing eyes open, was breathing with the death rattle. Her son was bent over the double-railing bed, viewing her retina.

"When my mother drew her last wisp," Davidson recalls, "I came up with a choke. I drew back and stopped the examination. Holding back a tear, I realized I was losing important moments of observation and returned immediately. At that moment, the nurses probably thought I was ghoulish. I watched for five minutes after death. Shortly after the last wisp, the red began to fade to yellow-gold. The red continued to dissipate for about two minutes. After that, the yellow-gold remained."

Since his mother's death, Davidson has examined three other dying patients, one in New Jersey and two others in Ohio. He says it has been difficult to find relatives of dying patients to agree to the examination. These few examinations, however, confirmed what he learned from his mother--when death comes, the red in the retina dissipates to ... gold.

An important implication of this finding lies in transplant operations where determining as soon as possible the exact time of death is crucial. Davidson says retinal color change appears to be a very accurate index of time of death. "A cop on a beat, finding a body, could quickly check for retinal color to determine if a person were still alive by using my method."

Davidson's work has not been well received by his KSU associates. "They don't like the fact I work more with applications and less with research. They don't think it's dignified."

A misunderstanding that alienated some of Davidson's colleagues occurred 20 years ago when he opened a small office in downtown Kent for psychological counseling. Since there was no professional code of ethics at the time, he advertised his office in the Yellow Pages. The situation took a bizarre turn when the phone book appeared with his name erroneously listed under the heading "Readings." He says he couldn't understand how the mistake was made, but it damaged his standing in the psychology department.

He says the lack of standing with some peers today doesn't bother him. "My work is new and different. It is understandable that some people just don't believe me."

Davidson says he dreams of an educational system where students' retinas could be illuminated by some constant source of light. (The retinoscope does not have to be directly in front of a subject.) Recording color sensors, attached to a console, would keep their retinas under constant observation. If the light on the console changed, the professor could tell immediately that a perception had taken place. Next he could determine if the student had the correct understanding of the material. He estimates that such a console for only four subjects would cost $25,000. He says there are recording photometers, or color sensors, already on the market that could be used to register retinal color change.

Another major implication of his work may lie in the areas of counseling and psychiatric interviewing. Because Davidson's technique identifies so quickly underlying resistance and conflict, it may prove an important tool for psychiatrists and clinical psychologists.

Davidson hopes to conduct two major experiments to produce statistics to constitute scientific corroboration for other professors in the same field. Dr. Harold Reppert, director of the Measurement and Research Center at Temple University and Davidson's advisor on his doctoral dissertation, says Davidson needs additional research to support his claims. He adds, however, "The dissertation was very satisfactory."

Davidson would like to train 20 to 30 clinical psychologists and psychologically-oriented optometrists in his method to serve as area consultants around the country.

Politically, a self-described moderate conservative, Davidson is an active Republican and has run unsuccessfully for several state offices, including state senator. He's "eyeing" a return to the political wars in the future. However, even as a conservative, he is aware of the radical possibilities his work could have if abused. "Invasion of privacy is certainly a fearful prospect," he acknowledges, "because the technique is relatively simple to learn." Fear of misuse and uncertainty in his work led him to give false statements to reporters when initial word of his experiments leaked out in 1967. Now, since his dissertation has been published, he says he has no reason to mislead anyone. Davidson remains confident that dealing with people's innermost lives has always been approached with thoughtful concern by professionals. "What is important in the professional world," he says, "is important to me when I use the Davidson Technique to probe people's minds."

William Lazarus is a graduate student in journalism at Kent State University. Ronald Kovach is a sophomore journalism student at KSU.

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THE NEW TIMES

By William Lazarus

The eyes have it

If this remarkable new technique is borne out, psychologists—and anyone else—will be able to tell what you're thinking merely by looking into your eyes.

"Look into my eyes, my love, and see
All the wondrous things you are
to me. . . ."

"The Shadow of Your Smile"

The dream of mankind for centuries . . . to be able to see into another's mind. To literally know another's thoughts.

Merely a dream. Or is it?

Not to Dr. Frederick Davidson, an assistant professor of psychology at Kent State University. After over ten years of research, he is convinced that he can tell what a person is thinking by merely shining a light in the subject's eye. Relying on known scientific principles, some only a few years old, Davidson has worked with police applicants, dying patients (including his mother), criminal suspects and thousands of volunteers. He has tested against the polygraph and convinced a trained polygraph operator that his way is better.

Davidson, 57, is a white-haired, heavyset, balding ex-Marine. He said his discovery "was an accident. I started out trying to duplicate experiments done a few years ago on children." Those experiments had indicated that the retina of the eye changes colors according to what the child was thinking or feeling.

"I wanted to see if the color changes appeared in older persons," Davidson explained. The work was part of his study for a doctoral degree in educational psychology from Temple University (Philadelphia).

After finding there was no literature on his experiments and findings, Davidson expanded his experiments and began to incorporate other factors helpful in determining emotional reactions. In 1968 he began to include a 1960 report by Dr. Eckard Hess in Chicago that has grown into the science of pupilometrics. Dr. Hess found that the pupil of the eye varied according to the subject's emotional state. Scientists already knew that the pupil opened and closed to regulate the amount of light entering the eye and that the pupil reflected emotional stress, but Hess' work and equipment produced more accurate results. Davidson likened that change to that of an animal that is cornered. "An animal's pupils get extremely large, which we know means extreme emotional activity like fear or alertness."

In the same year Davidson began to incorporate the area of focus change to help him better understand emotional responses. "I found that if a person didn't know an answer to a question, he became farsighted, as though his eye were reaching into his mind for the answer," Davidson said.

Using all three factors in emotional perception—color, pupil change and focus—Davidson continued his experiments, one on his dying mother.

Mrs. Helen Davidson, 80, was admitted to Robinson Memorial Hospital in Ravenna (Ohio) in late 1968 and died there on Jan. 1, 1969. She was terminally ill shortly after she entered the hospital.

Until she went into a coma, they communicated via the retinoscope. "I asked her if she liked something, like the orange juice, and I could tell by her retinal reaction if she did or not." Davidson examined his mother past the moment of death. His wife, Evelyn, and a friend also checked the dead woman's eyes with the retinoscope to confirm his findings. About two minutes after death, the red, which had been there since she had gone into her final coma, faded and in its place was a yellow-gold. Davidson had seen the yellow-gold before in subjects who were momentarily totally disinterested, but never for a long period of time.

Since his mother's death, he has examined three other dying subjects. All showed the same yellow-gold color soon after death. "The implications are immense," Davidson said. "If this is an accurate method of determining death, it would greatly speed up transplant operations and help doctors be sure of death."

His basic area of work for the present has been in criminology, where his study has implications for both police and criminals.

After the May 4, 1970, shootings of four students on the Kent State campus by Ohio National Guardsmen, the Kent State Police Department decided it needed better methods of selecting police and civilian personnel. Until this time, no policeman on campus had undergone any form of psychological testing before being hired. Then-Security Chief Don Schwartzmiller directed Detective Robert Winkler to find a suitable battery of tests.

"I had many volunteers and I would show them pictures or ask them questions or flash a number at them and then check their color change," he said. It

William Lazarus is a free lance based in Cleveland.

during one of these tests, begun in that he got results which differed published reports of the earlier experiments. "Early researchers had thought that a white color in the retina indicated perception and a red color showed no perception. I found that the red indicates an *emotionally* charged perception while white indicates a *non-emotional* perception," Davidson explained.

"For example, if I ask your age and I get a red color indication, I know that your age bothers you in some way no matter what you might say."

He determines the color change with a retinoscope, a medical tool similar to a flashlight which is normally used to examine eyes and ears. "It gives off a steady light," Davidson said. "I shine it into the subject's pupil (the black dot in the center of the eye) and it reflects off the retina in the back of the eye." He said he was not sure why there was a color change or why the colors were "crimson" and "scintillating white." He said he thought it was the result of a bioelectrical reaction in the retina.

"My major contribution is the discovery that the red color really means something," Davidson said. "Scientists had dismissed it and only concentrated on the white, but I think I've proved the red is just as important. It gives us two separate extremes on a chart so we can accurately mark physiological change.

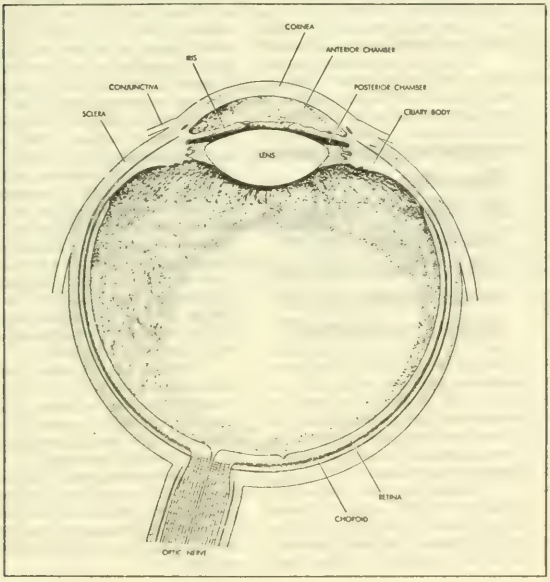
"I had an optometrist call me and tell me people knew about the white and red colors and the other changes 20 years ago. That's true. But they didn't know what the colors *meant*. They'd look at them, say 'that's nice' and ignore them. I've actually proved they mean something.

"Suppose I give you a retinoscope and I tell you to look in a subject's eye. We both see the changes, but you can't tell me what they mean. That's what I can do. It was hard at first. I had trouble seeing the changes and everyone else does, too. Now I can see them immediately, even though some are taking place in 1/24 of a second.

"It just bugs me that no one seems to care. I've really got something here. If I were well-known in the field, the other psychologists would be eating this thing up, but since I'm a nobody, they just shrug it off."

Davidson added that he conducted a worldwide search for data to corroborate his findings. "There was none. In Russia, in China . . . nowhere," he recalled.

Winkler said Davidson was already known in the department because of his interest in police work, so Winkler turned to him. Davidson drew up a series of tests, including a retinoscopic exam. Eight applicants underwent the tests before the tests were canceled in January 1971 by the new police chief, James Fyke.



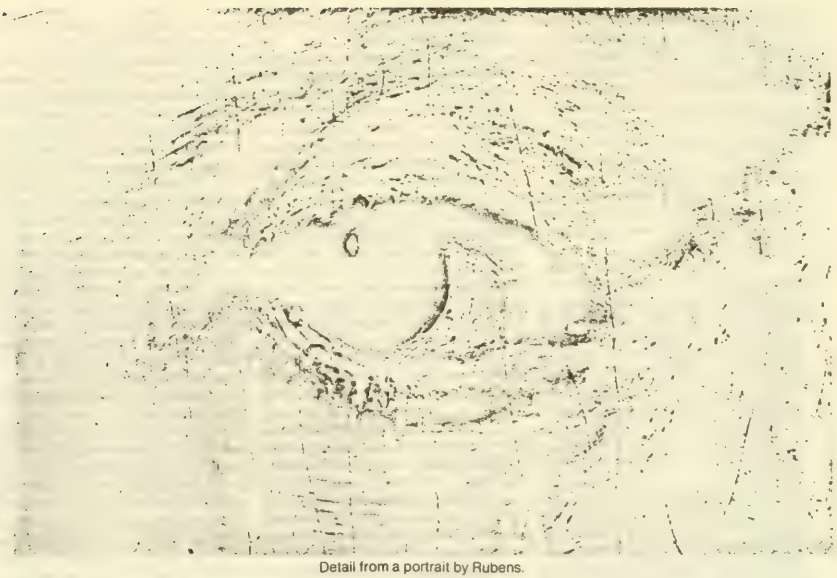
Davidson said he failed a few applicants. "I was testing for emotional stability in both personal life and in real police situations like riot or shooting." The only one he passed with a perfect recommendation turned out to be a better-than-average policeman, according to Winkler.

Davidson, who has been at Kent State since 1946, also has been called to interview crime suspects. "I remember one robbery suspect accused me of 'reading his mind.' The suspect was examined simultaneously by the retinoscope and the polygraph. We both agreed the suspect had stolen the property. But the polygraph examiner said the suspect had sold the stolen property, while I could see the suspect liked the property too much to sell it. That's when he accused me of reading his mind. The authorities recovered the property the next day," Davidson chuckled.

The man who ran the polygraph that day and worked with hundreds of volunteers in order to compare the lie detector with the retinoscope was Walter Kramer, administrator of the Portage County Juvenile Court and a trained polygraph examiner. Kramer, 54, is convinced that the retinoscope is superior to the polygraph. He said the retinoscope shows "degrees of guilt from embarrassment to downright lying." He added that the retinoscope can show the difference between a "white lie and a lie to protect yourself."

Davidson said another difference was that he could stand eight to ten feet away from a subject, whereas the polygraph must be attached with sensing devices to the subject. He added that a polygraph could be "beat" if the subject is under the influence of a drug or alcohol or had amnesia. He said the retinoscope was not affected by these problems because "I'm seeing the physiological reactions." He said the only trouble he ever had was with an older person who had cataracts. "I could see the changes," he said, "but not clearly enough to be positive. I'm going back to check this subject after her cataracts are removed." (Cataracts are a growth on the lens of the eye which inhibit the passage of light. He said people with extremely bad eyesight would probably give him a similar problem.)

He examined this reporter's eyes as a demonstration. The light shone into the eye seems to go right through into the mind. He asked several personal questions and commented about my subconscious feelings toward my brothers, my health and my family. In a similar demonstration in a Kent State journalism class, he asked a male student several questions, which were not answered orally, and was able to



Detail from a portrait by Rubens.

determine the student's feelings toward grades, his family and something about his moral life. "I don't need verbal responses," Davidson explained. "I can see the reaction before you can say anything."

All of the demonstrations were done in darkened rooms. However, Davidson said it doesn't matter how much light is available as long as he can focus on the subject's eye.

His work is potentially dangerous. Falling into the wrong hands, he explained, it can be used to control people in the ways envisioned in the book *1984*. "You see," he explained, "you may not even know you are being examined. A retinoscope can be set up anywhere, not just in front of you, facing you. Just so it focuses on the eye, it can be used to 'read' emotional reactions."

Learning how to use his method is also relatively easy. "All you have to know is a little about the physiological aspects and be an expert questioner," he said. In fact, he hopes to train 20 to 30 clinical psychologists in the use of his method and set up a national consulting office. He said anyone who needed his services could call and arrange for a visit by him or one of his assistants.

There are several beneficial applications of his research in addition to the ones related to death and crime. In psychiatry his method could be used to pinpoint areas of emotional stress. "I can tell if a subject is unstable or exhibits schizophrenic tendencies," Davidson said.

His major area is educational psychology. He said he dreams of the day when professors will use his method in the classroom. Students would be under constant retinoscopic examination and the retinal reactions would be picked up on a console on the professor's desk. The professor would be able to tell from light changes when perception had taken place. "There would be no need for tests," Davidson explained, "because it would be like instant examinations."

The retinoscope, in the wrong hands, is something out of *1984*. "You may not even know you're being examined"

Davidson began his work with the retinoscope in 1947 under Dr. Emmett Betts, a pioneer in the study of the psychology of reading. He holds a bachelor's degree from Allegheny College (Meadville, Pa.), received in 1939, and his master's from Temple University (Philadelphia), awarded in 1946. He presented a paper on his work at a pupilometrics symposium at the University of Manitoba in 1973 and said he hopes to make similar presentations this year.

He offered his work to the government for use in separating Viet Cong from Vietnamese during the Vietnam War and as a method of determining stress in astronauts while in space, but was rejected both times. Davidson, a Marine reservist, said he figured the military "thinks I'm just another eccentric." He said the reaction probably comes from the fact that he is not well-known. "I think this stuff is spectacular, but I'm just a nobody. I'm just going to have to convince other people." He is worried he will be called a charlatan, but he's convinced of his findings.

"For the sake of statistics, I'm 75 percent accurate because that's what psychology demands for probability. But in reality I'm 100 percent accurate. I keep thinking that next time I'll get tripped up, but so far I've never been wrong."

St. Jerome once wrote, "The face is the mirror of the mind, and eyes without speaking confess the secrets of the heart." If Davidson's findings are right, the venerable saint might prove to have been quite a prophet. ●

The Microwave Respiration Monitor*

J. Horowitz

Israeli Police Polygraph Laboratory,

Tel Aviv, Israel

Presented at the Miami, APA Convention 1973

* Work done in collaboration with the Department of Electronics, The Weizmann Institute of Science, Rehovot, Israel

Among the physiological factors recorded during the standard polygraph examination, blood pressure and respiration are considered as most effective for lie detection in field cases.

Emotional reactions of the subject cause pure quantitative changes in the pulse rate which are measured by the absolute number of heart beats per unit of time, or they cause simple rises and falls of the blood pressure tracing. The respiration reaction is much more complicated and its tracing consists of four different components:

a. breathing rate (number of inhalations and exhalations per unit of time).
b. amplitude of each inhalation or exhalation.
c. relative change in the volume of each breath.
d. distinguishing characteristics of each breath.

Consisting of compound data the respiration recordings provide wider and more meaningful information concerning the psycho-physiological situation of the subject. In addition to the reaction itself, respiration tracing provides a dynamic picture of the subject's emotional changes. It is feasible; at most, to interpret antecepatory reactions and after effects of the initial responses. Many examiners prefer, therefore, the complicated tracing of the respiration to the simple G.S.R. waveform or to the cardio-vascular tracing.

In addition to the intricacy of the respiration tracing, the conventional measurement with pneumatic apparatus limits to a certain degree the effectiveness of the recordings:

1. No possibility of regulation of the measuring sensitivity.

The process of inhaling or exhaling of the air causes changes in the volume of the chest of the examinee, resulting in an consecutive expansion and contraction of the rubber bellows. The pneumatic apparatus converts directly these changes to appropriate signals on the stripchart.

A "short breathing", or an unusual body configuration (like that of an obese person), or even tight underwear may cause an unreadible or distorted respiration tracing.

2. Inconsistency in recording.

The exactness of recording changes in the course of time and the reliability of the respiration recordings depends on:

a. The integrity of the rubber bellows, and its elasticity which change as a function of time.

b. Placement of the pneumatic bellows on the subject's chest or abdomen.

c. Extent of tightness of connection of the pneumatic bellows.

d. Amount of air inside the pneumatic bellows. During the examination, there is a gradual leakage, of air.

The polygraph examiner, even if he is aware of these limitations of the instrumentation, cannot always control them. Until the rubber has not lost its original firmness or has been torn, the average examiner will not feel

iat the instrument or its accuracy has been changed. We have to refer to the
caminer's training and personal skill in order to be assured that the
ieumo was placed on the right spot and in the right way.

. No way to calibrate and quantificate the respiration recordings.

The G.S.R. unit can be calibrated and its responses are measured by units
: electrical resistance or by vertical displacement on the chart. The pulse
ite can be estimated according to number of heart beats per unit of time. The
ardio-vascular unit can be calibrated with units of pressure. There is no
ay to get calibration of the respiration recordings. In order to get scientific
ecognition and perform empiric research, it is a essential requirement
) get a standardization of the technique. It is necessary at least to have
.e possibility to report what is the norm of the measuring apparatus at the
ime of the test. A second stage would be the quantification of responses.

. The attachment of the instrument to the examinee's body may cause physical
id psychological discomfort.

Some examinees have reported that they feel "like sitting on an electric
:hair" or "like mice in a laboratory".

The feeling of physical discomfort is likely to cause changes in the
haracteristic form of breathing, causing irrelevant disturbances, and may
'en distract the subject's attention from the questions he is being asked.

5. Understanding the operation principle of the pneumatic apparatus causes some subjects to contrc their breathing.

The respiration is the only physical factor examined which could be controlled directly, and it is usually the first one subjects try to control their emotional behavior.

Examinee's trials to "heat the machine" by movements or voluntary muscle contractions, are easily detectable and are in general an indication of deception. But there are examinees who just try to diminish their emotionality, controlling their respiration. Such behavior is more difficult to detect and shoult not, always, indicate deception.

So, polygraph examiners are in a situation where they get essential information through respiration recordings, but facing these problems, they feel they do not fully benefit of its advantages.

These are probably the reasons why less empiric research has been done on respiration responses than on the G.S.R. and cardio-vascular responses. Kubis (1962) and Barland (1972) found the pneumograph less reliable than the other components of the polygraph. Comparison of judgements of different polygraph examiners showed that the correlations of the pneumographs recordings were the lowest (Barland 1972). Moreover, the respiration parameter is probably tho only component of the polygraph system, the interpretation of which is influoncod soriously by difforont schools of training.

In order to exploit the great advantages of respiration as a psycho-physiological indicator of emotionality, and in order to overcome the

limitations imposed by the pneumatic standard instrumentation, it was decided by the Polygraph Laboratory of the Israeli Police and by the Weizmann Institute of Science to develope a new respiration monitor. This instrument should try to solve some of the problems of pneumatic apparatus which were described above. In addition, three main requirements were set up for the development of the apparatus:

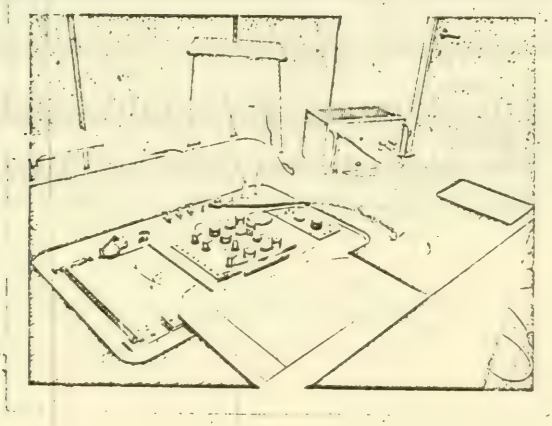
1. The manner of recording respiration should be as similar as possible to the measurement of the pneumatic apparatus, so that there would be no need for retraining of polygraph examiners.
2. It must be possible to measure respiration without connecting anything to the subject's body, and moreover, monitor from a reasonable distance (2-5 ft.).
3. The new device must be integratable with the existing polygraphs, without modifying the original device.

As an attempt to answer these requirements the Micro Wave Respiration Monitor (MWRM) was developed by the Department of Electronics of the Weizmann Institute of Science. The instrument consists of a micro wave interferometer, which measures the instantaneous relative distance between the chest cavity of the examinee and the instrument. The process of inhalation and exhalation of the air causes a change in the measured relative displacement. The changes are translated electronically to a recording on the examination paper. The instrument can be incorporated to the existing polygraphs.

The electronic measurement device of Prototype II of the MWRM is shown in pictures no. 1,2,3.

Figure 1 The examinee is connected to a pneumatic respiration recorder and simultaneously monitored by the micro wave instrument. The micro waves are emitted from under the high stool in front of the examinee.

Figure 2 The connection of the MWRM to the original " Stoelting" Polygraph. The micro wave is located in the stool and an electronic processor is on the examinees desk. A single wire connects the MWRM to the standard Polygraph.



In Prototype III, the size of the MWRM was minimized and both units were integrated in a regular attache case.

Prototype II of the MWRM was installed in the Polygraph laboratory of the Israel Police for testing. Initial pilot field research was done by comparing simultaneous recordings of respiration, of the pneumatic apparatus and the electronic device. The results of about 250 examinations in criminal cases permitted us to conclude that the initial goals established for the new respiration monitor were achieved.

Prototype II and the results of the pilot study were presented by Mr. Gorni at the last year APA meeting in Chicago.

Figures 3,4 show the clear similarity between the recording of the two instruments.

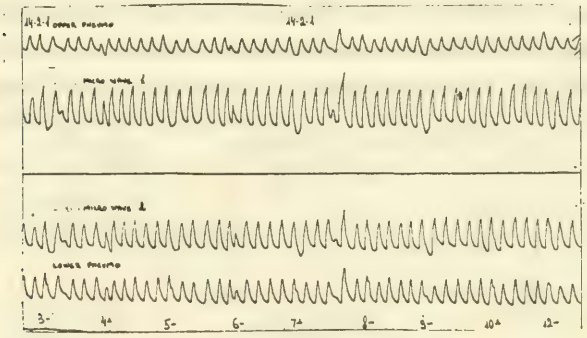


Figure 3: Reid Technique: Q3; Q5; Q8; Q10; Q12 - relevant; Q6 and Q9- control; Q4 and Q7-irrelevant.

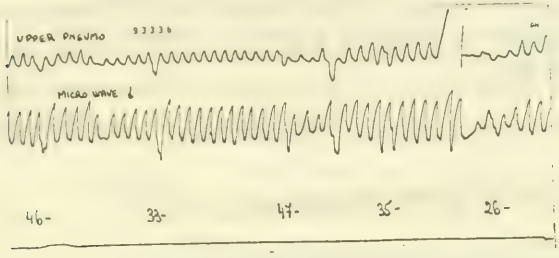


Figure 4: Backster technique: Q33 & Q35 - relevant; Q46 & Q47 - control.

The Weizmann Institute of Science continued the development of the MWRM and Prototype IV was installed in the Israeli Police Polygraph Laboratory at the beginning of 1973. This is an improved model which works with two micro wave channels. The recordings of the last prototype are much superior to the recordings received with the prior prototypes.

The following pictures show a few examples of simultaneous recordings of the pneumograph and the MWRM.

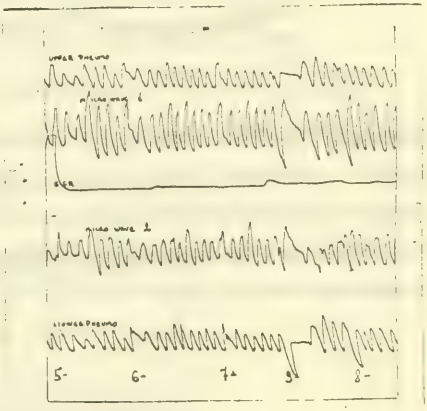


Figure 5: Reid Technique: Q5 and Q8-relevant; Q6 and Q9-control; Q4 and Q7-irrelevant. The recordings of the two devices are quite similar and if it would not be noticed which are the MWRM tracings and which are the pneumograph recordings, it would be impossible to distinguish among them.

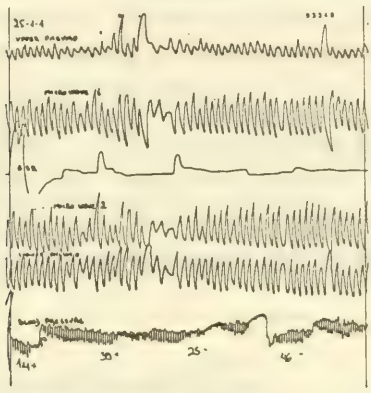


Figure 6: Backster technique. Q17-irrelevant; Q39-sacrifice question; Q25-outside issue; Q46-control. Obvious similarity of recordings although the MWRM recordings are inversed to the penumographic recordings. The MWRM tracings are sometimes a mirror picture of the pneumograph tracings, and this is due to the electronical monitoring

system. The mirror effect, as seen above, should not make any difficulties in interpretation of the tracing if the examiner notices it. On this chart, the mirror effect is clearly noticed making a comparison with the pneumatic recordings. In case there is only a MWRM recording, the examiner will notice the mirror effect immediately watching the subject's breathing and the simultaneous recording on the stripchart.

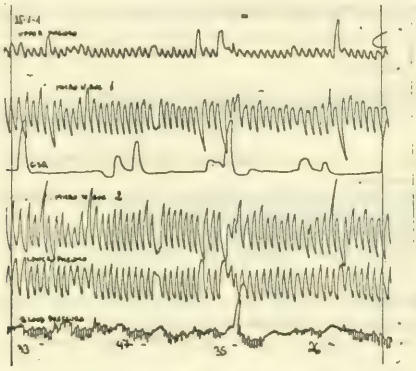


Figure 7: Backster technique: Q33 and Q35-relevant; Q47 control; Q36-outside issue. The MWRM recordings are a mirror picture of the pneumographic recordings.

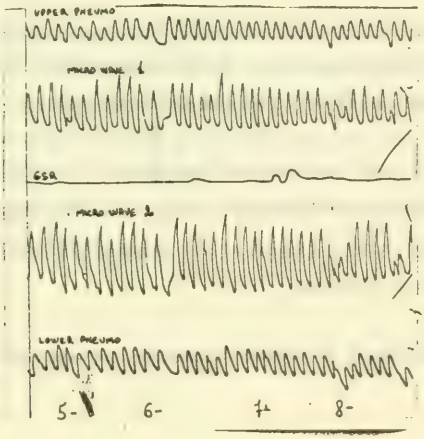


Figure 8: Reid Technique: Q5 and Q8-relevant; Q6-control; Q7-irrelevant. The recordings of MWRM contain more information than the pneumatic recordings. This is due to the possibility that exists in adjusting the MWRM sensitivity until it provides an optimal tracing.

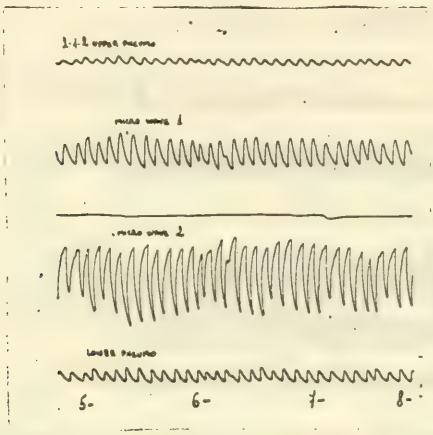


Figure 9: Reid technique: Q5 and Q8-relevant; Q6-control; Q7 irrelevant. The poor recording of the pneumograph is of an obese male subject. The MWRM recordings are much clearer and their interpretation is much easier.

Figures 3,4,5,6,7,8,9, show that the MWRM recordings of respiration are quite identical to the pneumograph recordings. In some cases the MWRM tracing is easier to be interpreted because of the existing possibility of adjusting the sensitivity of recording.

At this stage of development of the new instrument, an empirical validation research was needed.

FIELD VALIDATION RESEARCH OF MWRM

The validation research is based on 106 charts of polygraph examinations in criminal cases. 424 respiration responses recorded simultaneously by the pneumograph and the MWRM were evaluated in order to get a concurrent validity of the MWRM. The pneumograph recordings used as a validity criterion. The results of the research confirm the hypothesis: There is a significant similarity of the MWRM and the Pneumograph recordings according to the following criteria of evaluation:

1. Presence vs. absence of deceptive reaction
2. Characteristics of reaction
3. Strength of reaction a. duration of reaction
   b. proportion of amplitudes in the reaction

The results show that the proportion of amplitude was significantly higher in the MWRM's recordings. This is an indication of greater sensitivity of recording and wider opportunities of detection.

Subjects:

42 suspects in criminal cases, 23 of them were found nondeceptive. 18 were deceptive, one was regarded as inconclusive. There were 32 men and 8 women; their age ranged from 18 to 53 with a mean of 21.5.

32 subjects were examined in the Reid technique and 10 subjects were examined in Backster technique.

The two or three charts which followed the card test were included in the research. There was a total of 106 charts.

From each chart were evaluated 2 relevant and 2 control questions. In Reid technique, the relevant questions were Q5 & Q8 and the control questions were Q6 & Q9. In Backster technique, the relevant questions were Q33 & Q35 and the control questions were Q46 & Q47.

A total of 424 respiration responses were evaluated in this research.

Instrumentation

1. MWRM-Prototype IV
2. One six channel Stoelting Multigraph including:
   a. 2 Pnaumatic respiration channels: Thoracic (upper) channel and abdominal (lower) channel.
   b. 2 Microwave channels
   c. 1 G.S.R. channel
   d. 1 Cardio Vascular channel

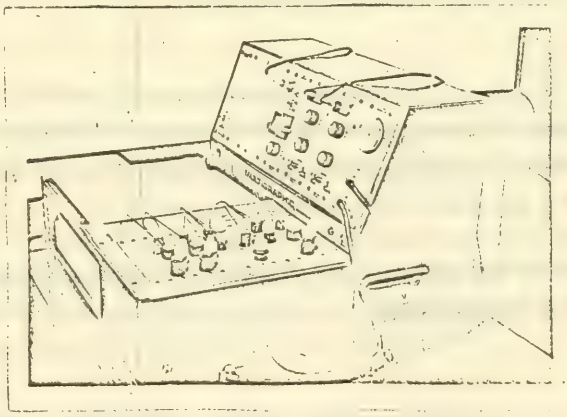


Figure 10
6 Channel
Stoelting
Multigraph

Procedures

No alterations were done in the conditions and procedures of the regular polygraph tests run in the Israeli Police Laboratory.

The respiration responses were evaluated in a double blind method according to 4 criteria:

1. DIR- deception indicated response - presence vs. absence of reaction - the examiner's interpretation of the presence of deceptive indication and in the response to the question.

2. TYPE-Distribution of reactions according to interpretation categories. The following 6 categories of interpretation were set up:
   a. staircase
   b. inversed staircase
   c. suppression
   d. baseline aroused
   e. movement
   f. noise

3. DUR-Duration of reaction, measured in units of time. The duration was measured horizontally from the beginning of inspiration of the first cycle within the response to the completion of the last cycle within the response (a).

4. PROPAM-Proportion of amplitude - height of the tallest cycle within the deceptive response divided to the height of the shortest cycle in the response ($\frac{b}{c}$).

Results

1. DIR

An evaluation of the respiration responses regarding the existence or absence of emotional reaction showed no significant difference between the two different recordings.

Table 1 shows a significant identicy in the evaluations of presence of deceptive indication in the response, in the MWRM and Pneumograph tracings. The number of responses evaluated differently is not significant.

TABLE 1 NUMBER OF RESPONSES INTERPRETED AS "LACK OF REACTION" VS. NUMBER OF RESPONSES INTERPRETED AS "PRESENCE OF REACTION". A COMPARISON OF THE PNEUMOGRAPH AND THE MWRM RECORDINGS (ABSOLUTE NUMBERS).

PNEUMO GRAPH / MWRM	PRESENCE OF REACTION	ABSENCE OF REACTION	ROW TOTAL
PRESENCE OF REACTION	47	16	63
ABSENCE OF REACTION	11	350	361
COLUMN TOTAL	58	366	424

47+350=397

397=93% OF IDENTICY IN INTERPRETATION.

CORRECTED CHI SQUARE = 226.57 WITH 1 DEGREE OF FREEDOM.

2. TYPE

TABLE 2. DISTRIBUTION OF RESPONSES ON THE PNEUMOGRAPH AND THE MVAM RECORDINGS ACCORDING TO INTERPRETATION CATEGORIES (ABSOLUTE NUMBERS).

PNEUMO / MVAM	STEREOTYPE	MIXED STEREOTYPE	SUPPRESSION	EXPLOSIVE MUSICAL	MOVEMENT	NOISE	ROW TOTAL
STEREOTYPE	203	7	11	5	-	-	226
MIXED STEREOTYPE	2	27	2	2	-	1	34
SUPPRESSION	13	1	27	-	1	-	42
EXPLOSIVE MUSICAL	3	-	-	6	-	-	9
MOVEMENT	-	-	-	-	19	-	19
NOISE	5	1	1	-	-	13	20
COLUMN TOTAL	226	36	41	13	20	14	350

CHI SQUARE = 866.47 WITH 25 DEGREES OF FREEDOM

Table 2 shows a main trend of identity in the classification of responses in the two different recordings. Watching the number on the diagonal (top left to low right) we observe high identity in interpretation of reactions. In 84% of all reactions was an identity in classifying.

3. DUR

TABLE 4. PEARSON CORRELLATION COEFF.

MWRM \ PNEUMOGRAPH	DURAM	PROPAM
DURAM	r=.711	
PROPAM		r=.663

A significant correlation (r=71) was found between the DUR appreciations done on the two recordings. No significant (p=1.0) difference was found between the means of the two DUR appreciations (Table 5).

4. PROPAM

A significant correlation (r=66) was found between the proportions of amplitude determined interpreting the MWRM and the Pneumograph recordings (see Table 4).

The PROPAM of the MWRM recordings was significant higher (pc .025) than the pneumatic recordings. This data indicates a more sensitive recording and easier detection of reaction with MWRM (Table 5).

A comparative analysis of the data obtained separately for the revelant questions (Q5 & Q8; Q33 & Q35) and the control questions (Q6 & Q9; Q46 & Q47) show no significant statistical trend.

TABLE 6. T "STUDENTS" TEST

VARIABLE	N	MEAN	STANDARD DEVIATION	STANDARD ERROR	T VALUE	DEGREES OF FREEDOM	2 TAIL PROBABILITY
DURAM PNEUMO	424	25.94	6.66	0.32	0.0	423	1.00
DURAM MWRM		25.94	5.44	0.26			
PROPAM PNEUMO	424	1.64	0.93	0.04	1.85	423	0.065
PROPAM MWRM		1.71	1.01	0.05			

Conclusions

The statistical data of the field validation research and the experience of the Israeli Police polygraphists confirm strongly the reliability and validity of the Micro Wave Respiration Monitor.

Statistical data and an evaluation of the polygraph chart with simultaneous recordings of Pneumograph and MWRM indicate that the later is most effective and in many cases the MWRM recordings are clearer for interpretation.

The MWRM is an electronic instrument which is superior in many respects to the Pneumograph in use.

1. The recording of respiration is done from a distance of 2.5 feet with no attachments to the examinee's body. Physical and psychological discomfort is spared in this way. In fact, the examinee would not be aware of the method of monitoring.

2. The MWRM can be regulated in order to receive always the optimal recording in any particular case.

3. There is a way of calibration of the apparatus and a possibility to obtain quantification of the respiration recordings. X mm of displacement on the recorded cycle corresponds to Y mm movement of the examinee's chest.

4. Being an electronic instrument, its technical reliability is higher than that of the pneumatic bellows which their sensitivity differs in the course of the time.

5. The MWRM's tracing is very similar to the Pneumograph recording so that no retraining of the examiners is needed in order to interpret the electronic recording. The adjustment of the instrument is very simple and needs little training.

6. The MWRM is of small size and it is connected to one of the existing channels of the standard polygraph instruments in use.

Mr. MOORHEAD. So I will make it very brief. How much more or less acceptable do you find these new devices, such as the PSE or the microwave respiration monitor, the Kent State device—how much more or less acceptable do you find them as compared to the older first-generation polygraph?

Mr. SMITH. Well, we find all of them unacceptable. But one element of the polygraph is, you would require the consent of the individual—oh, pardon me, the knowledge of the individual. Now that is not true in these other devices. Although you can't peer into one's eyes without his knowledge, he could be intoxicated or drugged and you could. I asked the developer of that device whether it would work on an unwilling subject and he said yes it will. So our real concern is that these devices can be worked surreptitiously.

Mr. MOORHEAD. The main difference in the second generation device is that you can be tested without the knowledge that you are being tested?

Mr. SMITH. Yes, sir, absolutely.

Mr. MOORHEAD. Second question, this subcommittee has been concerned in the matter of the invasion of privacy, the use of computers to put together data that couldn't at least not officially be done by the old manual means. I am at a loss though to know how computers can be used with the so-called lie detector systems to increase violations of privacy.

Mr. SMITH. Well, the results of a polygraph test could be shared to some remote location without the knowledge of the individual. He could perhaps with an attorney agree to submit to a polygraph test but not know that by computer communications the results were being shared with some other jurisdiction or at some remote location.

Mr. MOORHEAD. But that could be done just almost right now as officially without computer intervention? Could it not?

Mr. SMITH. Well, with computer technology there is a difference in quantity obviously and speed. But our second concern would be that polygraph results could be computerized and stored very easily and take on a life of their own. If polygraph results remain manual, perhaps there is some protection of privacy through the fact that they are difficult to retrieve.

Mr. MOORHEAD. Finally, I hope that you will be able to stay here and hear some of the other witnesses. The ACLU is very much dedicated to people's rights and the next witness has provided us with a statement which is entitled "The Polygraph Technique, Dedicated to Man's Right To Verify the Truth." Does the ACLU recognize such a right?

Mr. SMITH. I can't think of one. What it smacks of, it seems to me anyway, is what is perceived as man's obligation to help in an investigation about himself, that each citizen has an obligation to come forward and help and make sure that investigators have the truth. And although you and I may think that is the obligation of the citizen, Mr. Chairman, the Constitution recognizes the right to remain silent and to clearly place the obligation and the burden on the Government to prove wrongdoing. So that I don't think that every person has a right of truth verification, at least not in that way. I think that a jury trial is the way one gets the truth verified by hard evidence and facts.

Mr. MOORHEAD. Mr. Erlenborn?

Mr. ERLENBORN. Thank you, Mr. Chairman. I am interested in your recitation of individual cases, this sort of a parade of horrors as a lawyer might state it. Do you think it possible for someone to construct an equal number of examples of the legitimate and successful use of a polygraph device? If so, would that then lead one inevitably to the conclusion that we ought to use them or, to put it differently, Mr. Smith, do you think your recitation of these individual cases leads one inevitably to the conclusion that since there was a misuse, we should do away with the polygraph?

Mr. SMITH. I think the latter. I think that wiretaps are misused and, therefore, should be abolished and should be prohibited. I am sure that one could come up with a list of those who were suspected to be guilty and were able to clear themselves through the use of the polygraph, but I still think it is a very fragile device. I think that those cases show the overreliance on the polygraph. We seem to think in the public mind that it is a magic way to the truth, and I am not so sure that is reliable in clearing people by the machine who are otherwise thought to be suspicious.

Mr. ERLENBORN. I find your response interesting. I would like to comment on this because apparently you feel the only legitimate use would be for someone to prove himself innocent. The use of the polygraph, if it brought a conviction of a guilty person, does not appear from your testimony to be a success then.

Mr. SMITH. A success is bringing——

Mr. ERLENBORN. It is only a success according to your comment a minute ago, only if someone were able to prove himself not guilty.

Mr. SMITH. In the context of a polygraph. A success is convicting somebody on hard evidence that is corroborated.

Mr. ERLENBORN. So that there could be a successful use of the machine that would result in a conviction?

Mr. SMITH. No, I am not saying that. I don't recognize the use of the polygraph as a valid means of evidence. I think that a successful conviction is one based on hard evidence that can be substantiated by more than one source.

Mr. ERLENBORN. Of course, a different question is involved there, as to whether it is admissible as evidence. That varies from one jurisdiction to the other. As you have stated, generally it is not admissible. But it can be an investigative tool, just as an automobile can be used as an investigative tool to take the investigator from one place to the other. So it seems to me to be an illogical conclusion that you are reaching that, if it is not admissible in evidence, it, therefore, is not a legitimate investigative tool. That seems to be in my way of thinking faulty reasoning.

Mr. SMITH. No; I think wiretaps are useful investigative tools but in violation of the Constitution.

Mr. ERLENBORN. But they are not.

Mr. SMITH. The Constitution places—well, under certain prescribed circumstances, you are right.

Mr. ERLENBORN. I don't think it has ever been held that any use of the wiretap is unconstitutional.

Mr. SMITH. I think it had prior to the 1968 bill.

Mr. ERLENBORN. I don't think that is true. You don't think the Supreme Court has ever said that the use of the wiretap in every instance is unconstitutional?

Mr. SMITH. No, I think you are right about that, but I think the *Katz* decision almost granted the death blow to wiretaps, and then by congressional grant in 1968 the use was revived.

The American Civil Liberties Union Foundation regards them as a violation of the Constitution. I will say that.

Mr. STANTON. But that doesn't make the law though, does it?

Mr. SMITH. That is correct.

Mr. STANTON. And thank God for that.

Mr. ERLENBORN. Do you want me to yield?

Mr. STANTON. If you would?

Mr. ERLENBORN. Be happy to do so.

Mr. STANTON. First of all, I would like to point out that the misuse of the lie detector machine is evidenced by Mr. Colson, who pled guilty to a charge but had earlier used the lie detector as a device by which he supposedly proved his innocence. And I think that goes to the point that it can be used as a tool that is manipulative by the individual for his purposes. I just wanted to point that out because it is apropos to today's headline.

Mr. SMITH. It is a good example, I think.

Mr. ERLENBORN. Well, I would just make one last comment. I have no further questions, but the example used by the witness, that the only successful use of the machine would be to have someone prove his innocence, is, I guess, a sort of mentality that has built up over the years and reflected in some Supreme Court decisions, that the individual's right to prove his innocence or not to be prosecuted is all important. The right of society to protect itself against criminals is no longer very important. I would just like to say that I can't agree with that mentality.

Mr. SMITH. I would like, if I may, to respond to that. One, I think that what I said was that I suppose a list could be drawn up of those who had proved their innocence through the polygraph. I think it is an unreliable machine though. But second, the Constitution in my view does throw up lots of obstacles in the way of law enforcement purposely. That is what the Founding Fathers had in mind. I think that there are no shortcuts in law enforcement, and good hard evidence is what juries need to convict. And those in my opinion are successful convictions and not those based on machines.

Mr. ERLENBORN. Well, I don't think we have had many convictions based on machines. Once again I will say they are used as investigative tools but seldom, if ever, are the results of the machine test admissible in evidence. So I don't think you can have reason to do away with them fully. Thank you, Mr. Chairman.

Mr. MOORHEAD. Mr. Alexander?

Mr. ALEXANDER. Thank you, Mr. Smith, I thank you for your testimony. I compliment you for standing up for the rights of individuals. While you were testifying, I could not help but think about the difficult problem of balance that we have in Government. And from the standpoint of devil's advocate, I thought in terms of the position of

the executive branch, with which I have not been associated and which I have investigated many times and will continue to do so in the future. But I couldn't help but think of their problems of maintaining integrity within large bureaus. You made reference to a comment that I assume is correct, that the President allegedly had made about certain problems in the State Department. Now, have you considered the problem of balance when you take the position that you do with reference to polygraphs and with reference to individual rights? Have you considered the very essential ingredient of integrity and secrecy in maintaining close contact within the various departments and agencies on some policy matters?

Mr. SMITH. By all means, and I have thought long and hard about if there is a substitute for truth verification other than the polygraph and one that would protect individual rights. And no easy answer comes to mind, Congressman. But I do know one thing and that is use of the polygraph is a terrible blow to morale to Government employees. It is a degrading experience, and I would think that good morale in the departments contributes more to the national security than the use of polygraphs that may or may not catch wrongdoers. We had an example pointed out here this morning where perhaps it doesn't always catch those who have something to conceal. So that I would think that convincing Government employees that their work is valid and that they have respect and also that each agency has bona fide security forces that can investigate on the basis of hard facts—those sorts of things, I think, are much more beneficial to the national interest than reliance on a machine.

Mr. ALEXANDER. Thank you for your comments.

Mr. MOORHEAD. Mr. Regula?

Mr. REGULA. No questions.

Mr. MOORHEAD. Mr. Cornish, do you have any questions?

Mr. CORNISH. Yes, thank you Mr. Chairman. Mr. Smith, I think one of the most important statements that you make is contained on the first page of your statement where you say "But even if the device were regarded as totally reliable, we would still oppose the use of polygraphs, just as we oppose the use of wiretaps."

I wonder if you could expand on that thought a little bit? What if we had a totally reliable truth verification process without any question?

Mr. SMITH. One, it would still pry into first amendment protected views and, second, it would pry from persons information that they are not obligated to provide under the fifth amendment and, third, it would share information with others in violation of the fourth amendment and in addition it is a degrading experience and a violation of privacy. Wiretaps do the job they are intended to do, which is to monitor phone conversations. If polygraphs did the job they were intended to do, which is to detect so-called truthfulness, they would still violate the Constitution.

Mr. CORNISH. Do you know of any court in the country today that requires a defendant to prove his innocence?

Mr. SMITH. I know of none.

Mr. CORNISH. Thank you, Mr. Chairman.

Mr. MOORHEAD. Mr. Daniels?

Mr. DANIELS. No questions. Thank you.

Mr. MOORHEAD. Any further questions?

Well, thank you very much. I hope you will be able to provide the committee and Mr. Stanton with the information about the Cleveland complaint that he asked about?

Mr. SMITH. Yes, sir. Thank you.

Mr. MOORHEAD. The subcommittee would now like to hear from J. Kirk Barefoot, chairman, legislative and law committee, American Polygraph Association, Glenview, Ill.

Would you come forward please?

It is the practice of this subcommittee to administer an oath. I would like to administer the oath to you and your associate. Do you solemnly swear that the testimony that you are about to give this subcommittee will be the truth, the whole truth, and nothing but the truth, so help you God?

Mr. BAREFOOT. I do.

Mr. MARINO. I do.

Mr. MOORHEAD. Do you have a written statement?

STATEMENT OF J. KIRK BAREFOOT, CHAIRMAN, LEGISLATIVE AND LAW COMMITTEE, AMERICAN POLYGRAPH ASSOCIATION, GLENVIEW, ILL.; ACCOMPANIED BY CHARLES F. MARINO, GENERAL COUNSEL

Mr. BAREFOOT. Yes, Mr. Chairman; I do. I would like to say that I have submitted it in the form of a booklet. I believe you are holding it in your hand and that will constitute my written statement. It is the official position paper of the American Polygraph Association.

Mr. MOORHEAD. Well, then, without objection this statement in its entirety will be made a part of the record at the appropriate place and you may proceed with your oral testimony. Before you start though, would you introduce your associate?

Mr. BAREFOOT. Yes; I was just getting to it. I would like to introduce Mr. Charles Marino from Chicago, Ill., who is general counsel of the American Polygraph Association.

Mr. MOORHEAD. You may proceed.

Mr. BAREFOOT. Thank you. Mr. Chairman, in addition to the booklet which I submitted to the committee last week, I simply would like to cover several of the highlights in the booklet in my verbal remarks this morning.

Mr. MOORHEAD. If you are referring to the booklet, you might tell us the page so we can follow.

Mr. BAREFOOT. Yes; I will refer to several pages in the booklet. The American Polygraph Association was formed in 1966 through a merger of four predecessor polygraph associations. I would like to read from the booklet here just one paragraph concerning the objectives that were set forth by the association at the time it was formed. This is on page 31.

"The objectives of the American Polygraph Association shall be to advance the use of the polygraph as a profession as a means of promot-

ing social welfare by the encouragement of the use of the polygraph in its broadest and most liberal manner; by promotion of research into instrumentation and techniques; by the improvement of the qualifications of polygraph examiners through high standards of professional ethics, conduct, education, and achievement; to unify polygraph examiners throughout the world and rekindle their interest in the use of the polygraph and in the APA, by the increase and diffusion of polygraph technology through meetings, professional contacts, reports, papers, discussions and publications; thereby to advance scientific, professional and public acceptance of the contributions of polygraph techniques to the promotion of the public welfare and to keep the APA informed of member sentiment and urge the membership's active participation in civic and community affairs where the polygraph is concerned; and to publicize the name and prestige of the APA."

I would like also to call the committee's attention to some of the requirements for membership that we have in the American Polygraph Association and that is set forth beginning on the bottom of page 31 where we cover the required number of classroom hours in a polygraph training school that the examiner must have and the educational level that he must bring with him when applying for membership. If you will note in there, the constitution does require a degree at the baccalaureate level from a college or university. I would like also to touch on some of the functions of the American Polygraph Association that may not be quite as clear in the booklet. The association does have an ongoing program and has had, since its inception, of the accreditation of training schools for polygraph examiners. This involves considerable followup investigation and periodic visits to these schools to determine whether they are continuing to maintain the standards that were originally set forth for them.

The association conducts an annual advance training seminar once each year. It also publishes a scientific journal, Mr. Chairman, which I understand some of the staff members of your committee have had access to. We publish a newsletter. In recent years we have been very active in the encouragement of licensing legislation and regulation of polygraph examiners through licensing at the various State levels. We also have attempted to encourage a proper climate for the ethical operations of polygraph instruments. In accordance with that we have adopted a code of ethics and principles of practice. I believe it is on page 33. The code of ethics begins on page 33 and the principles of practice begins on page 34 of the booklet. I would like to mention just a word or two here about licensing and about regulation of the industry through licensing. To date, a total of 17 States have passed licensing legislation and are controlling the profession and regulating it through that method. Many of the States have followed the American Polygraph Association as far as setting forth the standards of education and training. By and large, most every one of the States follows the APA's accredited school list as far as approved training schools are concerned. Most of the laws that have been passed by the various States require a suitable formal educational background, a minimum specific training on the polygraph and also provide for an internship which is served at the conclusion of formal polygraph training. They also provide for a proficiency examination conducted by the State licensing board at the conclusion of the internship and also of course

they monitor such things as moral character and things of that kind. I would like to call the committee's attention to the question of reliability and validity of the polygraph. I don't intend to go into that in depth this morning unless you have some specific questions. But on page 10 running through page 16 of the booklet, we give extensive coverage to the scientific studies that have been done in recent years and in years past regarding the polygraph and the reliability and validity of the technique. I think that is quite amply covered in there. I might also make this observation, that I think because of the results of these studies that many of the courts in our land, both on the State and the Federal level, have in the past few years tended to view more favorably polygraph test results as evidence. That is also covered in the booklet.

Mr. MOORHEAD. Where is that?

Mr. BAREFOOT. Beginning on page 46. It is appendix 3. That is covered extensively in there. It does not cover recent court rulings in the latter part of 1973 and up into 1974 and there have been some of those. But this appendix 3 would show the trend——

Mr. CORNISH. Mr. Chairman?

Mr. MOORHEAD. Yes.

Mr. CORNISH. May I interject on that point. There are some later rulings and, as a matter of fact, some of the later rulings reverse the holdings which you cite here. Isn't that true?

Mr. BAREFOOT. Of the lower courts, yes.

Mr. CORNISH. Well, the one that is constantly mentioned is the U.S. district court under example (g) here on page 51. Wasn't that reversed by the court of appeals?

Mr. BAREFOOT. Yes, sir. I understand that it was.

Mr. CORNISH. Mr. Chairman, I wonder whether these decisions could be brought up to date for the benefit of the record?

Mr. MOORHEAD. Mr. Marino is the general counsel; could you do that?

Mr. MARINO. Yes, I could give you a rundown on the more recent decisions.

Mr. MOORHEAD. I don't know that we need it orally.

Mr. MARINO. Oh.

Mr. MOORHEAD. If you could submit it in writing?

Mr. MARINO. Yes, certainly. We will do that.

[The information follows:]

Following are a list of the more recent court decisions admitting the results of polygraph tests into evidence and supplements those cases set forth in "The Polygraph Technique," appendix 3, entitled "The Polygraph and the Courts" (pages 46–51):

A. *State courts*

1. *Commonwealth of Massachusetts* v. *Juvenile (BR–15,322)* decided by the Massachusetts Supreme Judicial Court in June, 1974 (it has not been published yet). The Court recognized that substantial advances have been made in the field of polygraphy since 1963 when the court rejected the admission of such evidence in *Commonwealth* v. *Fatalo*, 346 Mass. 266 (1963) and opened the door for the admission of polygraph examination results in criminal trials under certain circumstances.

2. *State of Wisconsin* v. *Stanislawski*, 216 N.W. 2d 8 (1974). In another recent decision (April 2, 1974), the Supreme Court of Wisconsin departed from its prior decision in *State* v. *Bohner*, 210 Wis. 651, 246 N.W. 314 (1933) wherein it had rejected polygraph evidence for any purpose and under any circumstances. In the

Stanislawski case, the court stated: "We find it clear that, during the same 40 or 50 years, polygraph tests have moved from the 'twilight zone' of Frye to such degree of standing and scientific recognition that unconditional rejection of expert testimony based on polygraph testing is no longer indicated."

The Supreme Court of Wisconsin there adopted the conditions for the admission of the results of polygraph examinations previously adopted by the Arizona Supreme Court in *State* v. *Valdez*, 91 Ariz. 274, 371 P. 2d 894 (1962).

3. *State of New Mexico* v. *Alderete*, 521 P. 2d 138 (1974). Also, in a recent decision (February 27, 1974), the Court of Appeals of New Mexico affirmed a trial court's decision which did not admit the results of a polygraph examination into evidence where the polygraphist failed to produce his polygraph records in court. However, Chief Judge Wood of the court found that upon a proper foundation being laid, the admission of the test results into evidence is within the discretion of the trial court. In a specially concurring opinion, Judge Lopez stated: "I fully concur in the opinion of Chief Judge Wood. I wish to add that I feel that polygraph testing is potentially of great value to the judicial processes of this state. When we are presented with a proper record meeting the requirements set forth in Judge Wood's opinion, I would hold this type of evidence admissible. I encourage counsel in future cases to develop such a record."

4. *State of Nebraska* v. *Sanchell*, 216 N.W. 2d 504 (1974). In this case (which was decided on March 21, 1974), the Supreme Court of Nebraska held that the agreement of a prosecutor that a defendant would not be prosecuted if he passed a polygraph examination was not enforceable absent the trial court's approval. However, the court there noted: "We do not want to do anything to discourage the use of polygraph as it is a useful tool in police and prosecutorial work and no doubt results in many determinations not to prosecute."

5. *State of Ohio* v. *Donna Sonnie*, No. 73 CR 100, June 20, 1974. The Court of Common Pleas for Lake County, Ohio, ruled that testimony as to the results of two polygraph tests taken by the defendant would be admitted "as an aid to the jury in arriving at credibility of witnesses and determine guilt or innocence." The court conditioned its ruling on the defendant taking an additional polygraph examination by an examiner selected by the prosecuting attorney subject to the approval of the court.

6. *State of Florida* v. *George Curtis*, No. 70–5585, January 31, 1973. The Circuit Court of the 11th Judicial Circuit for Dade County, Fla. allowed a defense motion for the admissibility of the results of two polygraph examinations, one given by an examiner of the defendant's selection and the other by a court appointed examiner. The court stated that in future cases, polygraph opinions would be admitted in the event the defendant, through his counsel, first requested the State to stipulate to a polygraph test and its results, and if the State rejects the stipulation, the defendant may apply to the court, who will appoint one or more qualified examiners to conduct a polygraph examination subject to certain conditions.

B. *Federal Courts*

In addition to *United States* v. *Ridling*, 350 F. Supp. 90 (E.D. Mich. 1972), two other Federal district courts have recently admitted the results of a polygraph examination into evidence, namely *United States* v. *Hart*, 344 F. Supp. 522 (E.D. N.Y. 1971) and *United States* v. *Dioguardi*, Criminal No. 72–1102 (E.D. N.Y. 1972) which was not officially reported.

In the *Dioguardi* case, a defendant charged with having falsified a loan application claimed that the handwriting on the application was not his. Although another man came forward claiming to be the guilty party, the Government alleged that his actions were essentially collusive. The defense attempted to introduce the results of polygraph tests on both the defendant and the man who claimed to have committed the crime, but the Government objected. In an evidentiary hearing, the polygraph expert for the Manhattan district attorney's office testified that in his experience the polygraph was more reliable than either handwriting or ballistic evidence, both of which are admissible at trial. Judge Weinstein of the Eastern District of New York, a member of the Advisory Committee on the Federal Rules of Evidence, then ruled that if the two men would agree to submit to a test by a court appointed expert, both the latter's testimony and the testimony of the defendant's expert would be admissible before the jury at trial. The results of the court-appointed expert's test and the defendant's test were apparently the same, and the Government agreed to dismiss the indictment.

In the *Hart* case, two former Federal narcotics agents were accused of soliciting bribes. The principal Government witness, a confessed narcotics dealer, revealed during cross-examination that he had taken a lie detector test at the request of the Government. When the tests indicated he was lying, the court ordered that the results be disclosed to the jury. Without holding a prior evidentiary hearing, Judge Judd ruled that the Government should be prepared to show why it administered the test to the witness and why it subsequently disregarded the results. The Government subsequently dismissed the indictment.

The decision of Barrington D. Parker in *United States* v. *Zeiger*, 350 F. Supp. 685 (District of Columbia 1972) to receive the results of a polygraph examination into evidence was reversed in a per curiam order by the Court of Appeals in 475 F.2d 1280 (1972). However, in an address before the Fourth Annual National Workshop on Practical Polygraph Procedures, Delta College, Mich., Judge Parker viewed the matter as follows:

"In 1971, Judge Earl Larson of the U.S. District Court of Minnesota in a post-trial motion for reduction of sentence filed on behalf of a defendant convicted of tax fraud was concerned with the 'criminal intent' of the defendant. His counsel was permitted—over the objection of the district attorney—to present testimony of a polygraph expert who testified at some length and in some detail as to the procedure employed.

"In 1972, Judge Weinstein of the Eastern District of New York in an unreported decision, ruled in an evidentiary hearing to admit the testimony of two polygraph experts, one court appointed, before the jury at trial.

"The defendant was charged with falsification of a loan application, but a third party admitted to the charge. The prosecuting attorney claimed, however, that his actions were essentially collusive. Both men agreed to and were examined by the court expert. The tests confirmed the defendant's contentions, and the Government dismissed the indictment.

"At approximately the same time in the Eastern District of New York there is a reported decision—*United States* v. *Hart*, 344 F. Supp. 522—involving solicitation of bribes by a narcotic agent.

"During the trial, it was brought out on cross examination of a Government witness that the witness had taken a polygraph test—administered by the Government—which indicated he was lying. Judge Orrin Judd, who was presiding, ruled that the Government must show why it administered the test to its witness and why it later disregarded the results. The Government then dismissed the case and elected not to appeal the trial court's ruling.

"More recently—in 1972—two reported opinions were regarded as signaling perhaps a change in the established rule against the admissibility of polygraph testimony.

"In *U.S.* v. *Ridling*, District Judge Charles W. Joiner of the Eastern District of Michigan in an extremely well reasoned and analytical opinion ruled that the defendant who was charged with perjury would be tested by a court-appointed expert and that the results of the test would be disclosed to the jury. Judge Joiner after conducting an evidentiary hearing wrote an opinion which could very well serve as the precedent for which other district court judges have long sought.

"And then there are the proceedings and opinion in *U.S.* v. *Zeiger*. In that case, your speaker was impressed by the highly professional performance of Mr. Frederick Barnett, the lead counsel, and the knowledgeable witnesses, Mr. Lynn Marcy, Mr. John Reid, Mr. Warren Holmes, Mr. David Raskin, and Mr. Cleve Backster. Judicial restraint and modesty demand that I limit my comment on the *Zeiger* case. As you know, the lifespan of that opinion was limited. And in less than 72 hours it was reversed by the U.S. Court of Appeals for the District of Columbia without an opinion.

"The unfortunate aspect about the case was that no opportunity was afforded for a complete and detailed briefing and argument of the issues involved.

"The case went up on appeal pursuant to a provision of the D.C. Code permitting the United States to appeal a ruling during the trial which involves a substantial question of law requiring appellate resolution. The Code provides for an expedited appeal, with argument before the appellate court and a decision by them within 96 hours. Because of limitations on time and briefing, a full and comprehensive presentation of the subject was impossible.

"Following the ruling on inadmissibility, the trial resumed, and fortunately Mr. Zeiger was acquitted. This might be regarded as an unfortunate development for his counsel—who were deprived the opportunity to present a well-developed

brief and argument on all issues—allowing for a more thoughtful and deliberate consideration by the appellate court under normal circumstances."

(A copy of Judge Parker's address is enclosed.)

Also, in *United States* v. *Lanza*, 356 F. Supp. 27 (M.D. Fla. 1973), Judge Tjoflat found that an insufficient foundation was laid in that case to justify admitting the results of the polygraph examination in evidence. However, he disagreed with the Government's position that the results of polygraph examinations should never be received into evidence and ruled that given an adequate foundation, it would be within the discretion of the trial judge whether to receive such evidence. The court there stated (p. 30):

"During the trial of this case, the defendant, John Newton Fountain, advised the court that as a part of his defense he proposed to offer expert testimony on the results of a polygraph examination that had been administered to him. The Government objected to the admission of any evidence relating to the polygraph test, citing numerous decisions on the subject and noting that no Federal court has admitted the results of a polygraph examination.

"In *United States* v. *Chastian*, 435 F. 2d 686, 687 (7th Cir. 1970), and *United States* v. *Wainwright*, 413 F. 2d 796 (10th Cir. 1969), both cited by the Government, the refusal to admit the polygraph results were based on the failure of the proffering party to lay a proper foundation for the testimony. In each instance, the court noted that, given an adequate foundation, it would be within the discretion of the trial judge whether to receive such evidence. The court views this, rather than the per se rule urged by the Government, to be the correct approach to the question of admissibility."

As you can see from the above, there are a growing number of court cases each year in which the results or polygraph examinations are being recognized as admissible in evidence under certain circumstances and provided a proper foundation is laid. I expect that this pattern will continue in the future. If I can be of further assistance to the subcommittee, please advise.

Very truly yours,

CHARLES F. MARINO.

THE POLYGRAPH AND THE FEDERAL COURTS

ADDRESS OF HON. BARRINGTON D. PARKER, U.S. DISTRICT JUDGE, BEFORE THE FOURTH ANNUAL NATIONAL WORKSHOP ON PRACTICAL POLYGRAPH PROCEDURES, DELTA COLLEGE, MICH., MAY 9, 1974

Those of you who are familiar with the frequently quoted treatise of Dean Wigmore on evidence will recall that in discussing the fallibility of a witness' testimony, he observed that "If science ever devises a psychological test for the valuation of witnesses, the law will run to meet it."

The Wigmore text was published in 1923. And it is of more than usual interest to note that in the same year, 1923, Justice Vans Orsdel of the U.S. Court of Appeals for the District of Columbia, in one of the early appellate court decisions dealing with the admissibility of what was then referred to as lie-detector tests—and the two appellate court judges who concurred in his opinion—all elected to run in the opposite direction.

In the case of *Frye* v. *United States*, Justice Vans Orsdel speaking for a unanimous court ruled that the lie detector had failed to rise to the required degree of scientific recognition to warrant admission as reliable scientific evidence, and in a brief opinion it was summarily rejected.

In *Frye*, the defendant was charged with a homicide. Soon after his arrest, he gave a confession, which he later retracted and claimed innocence.

Prior to his trial, a systolic blood pressure test had been administered to him, and on basis of the results, his declaration of innocence was regarded as truthful. The trial judge ruled, however, that the test results were inadmissible.

The defendant could offer no evidence or testimony to support his defense. The jury returned a guilty verdict and Frye received a life sentence.

Yet, there is an interesting and unpublished footnote to the case. Several years later as a result of further investigation and continued interest, the real murderer was flushed to the surface and Frye was released after serving 3 years.

In holding that in 1923 the lie detector test had not attained the degree of accuracy and reliability generally required of scientific evidence, the *Frye* court advanced this reasoning:

"Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-organized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

"We think the systolic blood pressure deception test has not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the courts in admitting expert testimony deduced from the discovery, development, and experiments thus far made."

As we all know that decision became the predicate upon which trial and appellate courts have for nearly 50 years consistently denied the admission of polygraph test results.

But despite the continuing influence and adherence to Frye, we are not unaware of significant changes in attitudes that have taken place over the last several decades. And now perhaps it can be said that the polygraph has emerged from the twilight zone.

It has been and continues to be the subject of scientific study and refinement. And although the precise limitations of instruments used and the intricacies which affect its performance may not be understood to the complete satisfaction of the scientific community and the legal profession, enough is known to confirm the belief that it is one of several useful tools for detecting deception.

Its growing use by civil and military agencies of the Federal Government, by local and State law enforcement agencies, and by private industry is testimony to the value and efficacy of the technique.

The trial courts of several jurisdictions have regularly admitted and relied upon the results of polygraph in connection with other evidence in criminal and civil trials and related proceedings. Committing magistrates have used them as an aid in conducting preliminary hearings. They have been utilized in post-trial, presentence hearings. An increasing number of domestic relations and family courts have found them to be of valuable assistance in paternity, divorce, and child custody proceedings. And there are reported civil cases where they have been utilized—albeit sparingly.

The reluctance of the judiciary to accept the polygraph technique is most apparent in the Federal Courts. It is only within recent years—in two unreported decisions and in several reported decisions—that we note what some optimist might refer to as a trend toward the recognition of the scientific validity of the polygraph by the Federal judiciary. Unfortunately none of these cases has been fully briefed and argued in the U.S. Court of Appeals and so we are still confronted with the *Frye* decision.

In 1971 Judge Earl Larson of the U.S. District Court of Minnesota in a post trial motion for reduction of sentence filed on behalf of a defendant convicted of tax fraud was concerned within the "*criminal intent*" of the defendant. His counsel was permitted—over the objection of the district attorney—to present testimony of a polygraph expert, who testified at some length and in some detail as to the procedure employed.

In 1972 Judge Jack Weinstein of the eastern district of New York in an unreported decision ruled in an evidentiary hearing to admit the testimony of two polygraph experts—one court appointed —before the jury at trial.

The defendant was charged with falsification of a loan application, but a third party admitted to the charge. The prosecuting attorney claimed however that his actions were essentially collusive. Both men agreed to and were examined by the court expert. The tests confirmed the defendant's contentions and the government dismissed the indictment.

At approximately the same time in the eastern district of New York there is a reported decision, *United States* v. *Hart*, 344 F. Supp. 522, involving solicitation of bribes by a narcotic agent.

During the trial it was brought out on cross examination of a Government witness that the witness had taken a polygraph test, administered by the Government which indicated he was lying. Judge Orrin Judd who was presiding ruled that the Government must show why it administered the test to its witness and why it later disregarded the results. The Government then dismissed the case and elected not to appeal the trial court's ruling.

More recently, in 1972, two reported opinions were regarded as signaling perhaps a change in the established rule against the admissibility of polygraph testimony.

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The arguments against the polygraph technique are many, but a few of the more important may be briefly catalogued. One of the major challenges is that the scientific validity of the technique has not been adequately established. In 1965, hearings were held before the congressional Committee on Government Operations and the conclusions of the hearings—referred to as the Moss hearings, were:

There has been no attempt to determine the validity of the procedure and no attempt to find out whether the polygraph operator really can detect falsehoods.

No statistical proof has been compiled despite thousands of cases; no scientific proof has been produced despite thousands of opportunities.

While many studies have been undertaken relating to the polygraph device and technique the studies which verify the technique is either simulated or actual investigations are extremely limited and at a minimum.

Another is that too frequently the person proffered as an expert possesses a very narrow and limited scientific background in the field of deception. In the *Zeiger* case before me, one of the major contentions of the United States attorney was that the defense expert witnesses, with a few exceptions, lacked expertise in psychophysiology, but rather were field polygraph examiners.

Referring again to the *Zeiger* case, the person who actually examined the defendant was challenged by the Government because of the absence and lack of comprehensive notes made during the pretest interview and the failure to otherwise make a full and accurate record, thus preventing an objective consideration of the interview.

Aside from objections to the technique itself, there are those objections which relate directly to their use during the course of a trial. They too may be briefly cataloged.

Such evidence tends to overimpress juries. Juries will tend to give such testimony too much weight. Use of the polygraph will inject too many collateral issues in the trial. The role of the jury will be supplemented by a machine or by a polygraph examiner. The testimony of the examiner presents a serious hearsay rule problem.

I do not consider this the appropriate forum to do more than to point out that these are legal issues which are ever-present. In my judgment, however, such arguments can be successfully challenged and refuted.

As a U.S. district judge, I have presided over a number of criminal and civil trials, some complex and some not so complex. I have listened to the testimony on the qualifications of the expert witness and ruled on their qualifications. I have listened to and ruled on the admissibility of the substantive testimony of the expert witness on the subjects of fingerprints, voice prints, firearm identification, hair samples, handwriting identification, and the so-called paraffin tests.

I have observed these witnesses survive excellent cross-examination. I have also observed these witnesses when they have been subjected to devastating cross-examination which has virtually destroyed their credibility. And parenthetically, I may say that the so-called expert testimony of a witness on hair samples, identification of handwriting, and the result of a paraffin test have always given me a particular trouble.

Only several years ago, one of my colleagues on the U.S. district court ruled in favor of and wrote an opinion upholding the admissibility of voice-print evidence in a criminal trial. And I can recall that it was not so long ago when such testimony was almost uniformly rejected.

While indeed the field of polygraphy is becoming more and more standardized and professionalized, for increasing acceptance by the courts, I am not reluctant to suggest certain measures for serious consideration, many of which indeed may have been called to your attention and adopted by your membership.

First and foremost is the necessity of establishing the reliability of the technique. There must be greater efforts to accumulate hard solid data establishing the scientific predicate on which the polygraph rests. Systematic and deliberate steps must be taken and increased to statistically document the accuracy of the results announced by field examiners.

There has been a lamentable deficiency of empirical information and data which support and demonstrate the validity of the underlying premises upon which the polygraph examination rests. More information, more data, and more published in-depth studies are sorely needed. And in this connection, the possibility of securing financial funding of further studies by either the private sector or by the Government should be explored.

The time has arrived when a polygraphist should be licensed and certified as qualified by a constituted accrediting agency only when he has been exposed to a minimum of training and experience to qualify him as a polygraph examiner. The training should embrace a study of psychology, physiology, and the other necessary disciplines. Provisions should be made for a required continuing education program designed to insure that the examiner keep abreast of current developments in the field.

Adequate measures should be adopted within your profession for the discipline of unqualified examiners.

Serious consideration should be taken to the possibility, insofar as it is practicable and feasible, of developing at least minimum and uniform standards and guides to be observed by the polygraphist in conducting the test.

Steps taken in these directions would in my judgment, when presented to the trial judge, tend to be most persuasive and assist the court in determining the threshold question of admissibility.

Mr. MOORHEAD. Thank you, you may proceed.

Mr. BAREFOOT. Well, Mr. Chairman, that concludes my informal remarks this morning, and I hold myself open for questions of the members of the staff or the committee.

Mr. MOORHEAD. Thank you. I do have some questions I would like to submit to you in writing for answer when the transcript is given to you for correction. So I will be very brief on the oral questions.

I understand that you are of course representing the American Polygraph Association, but does the association have any wisdom to share with the subcommittee on the subject of the new types of so-called lie detectors—and I say that in quotes—for instance the stress evaluator, the one described by the previous witness' statement, the one at Kent State or the Weizmann Institute?

Mr. BAREFOOT. Not specifically on each and every one of those, Mr. Chairman, but I would call your attention to a resolution passed by

the board of directors and adopted by the membership of the American Polygraph Association in August of last year. This resolution is stapled to the back inside cover of the booklet. It is a two-page resolution and I believe that it does go to the heart of your question as to what position we are taking on the PSE or any of these other devices that have been referred to here this morning.

Mr. MOORHEAD. I notice paragraph 4, where you stress that the polygraph examination would be conducted only with the consent and cooperation of the person being examined. Is that the major distinction your association makes with respect to polygraphs and other new technologies that can be used without the consent of the person being examined?

Mr. BAREFOOT. Well, I don't think we are ready to concede that some of these other techniques could be properly utilized from a scientific basis without the knowledge of the person, but here again I don't know.

There is a question in that area apparently that has been raised, and I am not familiar enough with these new devices that I could really answer that.

Mr. MOORHEAD. Has your association made any testing on the accuracy, on the validity, and so forth of the new technologies as compared to the polygraph?

Mr. BAREFOOT. The association does have a testing program underway at the present time. It has been, I believe, in operation for about a year, Mr. Chairman, where comparisons are being made between polygraph results and PSE. This is being conducted by our Instrumentation and Research Committee. They have not yet come forward with a report, to my knowledge.

Mr. MOORHEAD. When do you expect that report?

Mr. BAREFOOT. I would hope to have it by August of this summer, when we have our next annual seminar. I would think it would be completed and presented to the membership at that time.

Mr. MOORHEAD. I hope when those results are out that you would share them with this subcommittee.

Mr. BAREFOOT. We would be happy to.

Mr. MOORHEAD. Because this is one of the major concerns we have.

Is it your position that the use of these devices without the consent of the person being tested is an invasion of that person's privacy?

Mr. BAREFOOT. That would be my personal feeling, yes.

Mr. MOORHEAD. But it is the position of your association that the administration of the polygraph test with the "consent of the person," and I use that with quotations, of the person being examined, is not an invasion of the person's privacy?

Mr. BAREFOOT. Yes, sir, that is correct. That would be our position.

Mr. MOORHEAD. Some of the situations where it is supposedly voluntary, and I say that in quotes, a "voluntary submission," nevertheless are under some degree of coercion. I mean, you get a job if you submit to the test, and you don't get the job if you don't submit. Now, if it is a matter of your family going hungry if you don't submit to the test, is that voluntary? That is hardly voluntary, is it?

Mr. BAREFOOT. Well, I think we have to realize, Mr. Chairman, that the test, as it is used in private industry today, is not a widespread

thing. It is used selectively in certain industries, for certain types of jobs that could be well termed "sensitive" because of the nature of the job.

And I don't think there is anybody in the American Polygraph Association that advocates the use of polygraphs for all jobs. It would be unrealistic, and so there are plenty of jobs. It is a question of where you are going to use it for sensitive jobs and not for the balance.

Mr. MOORHEAD. Yes, but I think this whole thing bothers me. I think there is a valid use, as Mr. Erlenborn said, for investigative purposes. The previous witness came up with the horror stories about people who were innocent and were found guilty by the polygraphs, but I think you could come up with stories of innocent people, of people thought guilty and yet proved innocent by the polygraph. There are kinds of horror stories on each side. But there ought to be some legitimate way of articulating where it can be used properly and where it should not be used. And I don't really know the answer to that. That is the purpose of these hearings. Now one final question. I don't see where the computer technology makes the polygraph either more beneficial, or more of a horror story, if you take either emotional extreme. I just don't see the technology adapted to it.

Mr. BAREFOOT. I don't either, Mr. Chairman. Certainly in the realm of private industry the use of computers in connection with polygraphs, well, I just can't fathom where there would be any connection.

Mr. MOORHEAD. Well, thank you, sir.

Mr. Erlenborn?

Mr. ERLENBORN. Thank you, Mr. Chairman. Mr. Barefoot, on page 30 of your booklet you have one sentence—no, two sentences—that I think are quite relevant to our hearings. Let me read those two sentences: "When all is said and done, the polygraph is neither devil nor angel. It is simply another of man's tools; as such, it can be used wisely or misused."

I think that is a very important statement. The chairman has expressed my feeling: that it is difficult to tell when it is being used wisely or misused, that there probably is an area of abuse that has occurred in the past and probably is still occurring today and will occur in the future but also an area of legitimate use. I think we might draw a corollary to the use of the physical examination as a condition of employment or as a condition to continued employment. Physical examinations, I think, are quite an invasion of privacy. I mean a complete physical. Yet I think it is accepted quite widely as a condition of employment. I know many employers require a physical examination. If you won't agree to it, you don't get employed.

In some instances, depending on the type of business, of say, a food service business, periodic physical examinations may be required. Do you think that this is a valid corollary?

Mr. BAREFOOT. Yes, sir, I do. We have always taken the position that the physical examination, if we talk in terms of invasion of privacy, is much more personal than what a polygraph examination is.

Mr. ERLENBORN. Do you believe in the right of privacy?

Mr. BAREFOOT. Yes, sir I do. I think that that right has to be balanced against the rights of others, however, in certain instances.

Mr. ERLENBORN. Do you know of any absolute rights that any of us enjoy or aren't most of our rights conditioned?

Mr. BAREFOOT. I think all of our rights are conditioned to some degree.

Mr. ERLENBORN. I think, as our society gets more complicated and as the population grows, we all will become aware of this. I recall when I first started practicing law, the zoning of real estate for various uses was quite a novel device and it was widely resisted. As a matter of fact, one of the circuit court judges in our county never did believe in zoning. If you got a case before him, he would throw it out every time. But certainly as landowners we ought to have a right to use our land for whatever reason or purpose we desire until that begins to conflict with our neighbors' rights. Well, I guess I am giving a lecture rather than asking a question. To sum it up, I think that you can't take an absolute position and say that this is absolutely bad or absolutely good. It is a matter of balancing rights and balancing good against evil for the overall good of society. I don't know that much about your association, Mr. Barefoot, as to know whether you have devised standards that would meet that test, but I would hope that there is a professional association that would do that, and I would hope that the State legislatures or the Federal Government, if that becomes necessary, would devise standards that would meet that test.

Mr. BAREFOOT. Well, Mr. Erlenborn, I might mention that many of the things that you are referring to are covered in our code of ethics and the principles of practice. Just as an example, we take the position that a person should not be discharged from a job for refusing to take a polygraph test.

Mr. ERLENBORN. Some police departments have a rule to the contrary.

Mr. BAREFOOT. Yes, that is correct. In police work that is true.

Mr. ERLENBORN. How do you feel about that rule?

Mr. BAREFOOT. Well, it is a rule that has been, as I understand it, upheld by the appellate court on the Federal level. It may be justified in police work. I don't know. I don't think that there is any justification for that in private industry. I don't think there is any at all.

Mr. ERLENBORN. Thank you, Mr. Chairman.

Mr. MOORHEAD. Mr. Cornish?

Mr. CORNISH. Thank you Mr. Chairman. Mr. Barefoot, I have read this document, which you submitted, with a great deal of interest. As a matter of fact, I was struck by the same quotation which Congressman Erlenborn pointed out wherein you do say that the polygraph can be misused. I don't know if that is your personal statement and perhaps I should ask you whether you agree with that statement?

Mr. BAREFOOT. Oh, I think that is true of anything, Mr. Cornish, that the polygraph could be misused in the wrong hands. I think that you can find examples of misuse or abuse of any of the professions and the polygraph profession is no different.

Mr. CORNISH. Now when the misuses or abuses—however you want to characterize them—are called to the attention of the association, what do you do?

Mr. BAREFOOT. We have a grievance procedure and a complaint can be presented to the grievance committee. At that time the polygraphist or the polygraph examiner who is the subject of such a complaint would be notified that charges have been filed against him for one reason or

another and he would be given an opportunity to defend himself in front of the grievance committee when it meets to hear this issue. Its recommendation one way or the other would then be passed on to the board of directors for a final adjudication and at that time the examiner in question would also have another opportunity to present his side of the story to the board. The board would make the final determination as to what disciplinary action, if any, would be taken.

Mr. CORNISH. Does a Government employee have the right to come and present a grievance to your association?

Mr. BAREFOOT. Anybody would have that right, yes; just as an ordinary citizen.

Mr. CORNISH. How many grievances do you hear a year on the average?

Mr. BAREFOOT. I would say approximately 10.

Mr. CORNISH. Can you recall from say last year's grievances how they were resolved, whether in favor of the complainant or in favor of the examiner?

Mr. BAREFOOT. Well, I am not a member of the board of directors which would hear these things but——

Mr. CORNISH. Perhaps your counsel could answer that?

Mr. BAREFOOT [continuing]. But I know one person was suspended from membership for a period of 6 or 9 months or something like that.

Mr. CORNISH. Now I notice also that on page 6 of the booklet you state or rather the association states—well, how shall I characterize this, the association? Is this the statement of the association?

Mr. BAREFOOT. This is the official position paper of the association.

Mr. CORNISH. The statement is: "Labor has consistently opposed and obstructed efforts to protect the public rights and the personal rights of all citizens by this means. Instead of 'personal rights' are these representatives of labor really not advocating 'the right to lie, cheat, and steal without discovery?'"

Now I found that statement fascinating because in your very own submission in appendix IV you include an article which appeared in the 880 News and Views, which is a publication put out by the Retail Store Employees Union 880 in Cleveland, Ohio, and includes an article by David McDonald, president of that local. And in it he makes this statement: "I strongly recommend that any employer who suspects a worker of dishonesty get in touch immediately with Local 880. If there is any cause for pursuing an investigation, we will cooperate to the fullest. If disciplinary action is needed, we will not stand in the way of any fair and, if necessary, firm, action. If we find reason for calling the police or the prosecutor's office, we will support that, too."

Now I think that right in your own submission you have given some evidence of a public declaration by a union leader; they certainly don't accept the statement which is contained in the association's statement, that is, they are not advocating the right to lie, cheat, and steal without discovery.

Mr. BAREFOOT. Well, Mr. Cornish, I think we are simply posing that question and it is in the form of a question.

Mr. CORNISH. Yes, and the answer comes next. It says: "Reasonable and honest people can supply their own answer without our help."

Mr. BAREFOOT. That is right. That is the way we feel.

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would fall into that category would be the States of New York and California. The other large States where there are a large number of practitioners have been licensing and have regulation.

Mr. STETTNER. Are you experiencing any particular problem in the State of New York having people licensed?

Mr. BAREFOOT. They are not licensed, sir.

Mr. STETTNER. Well, in your efforts to have them licensed are you experiencing a problem?

Mr. BAREFOOT. Well, in New York the New York association, there is a State association in New York of polygraph examiners, has been active over the past number of years in attempting to secure licensing legislation. So far it has not passed as yet.

Mr. STETTNER. Is that because labor objects?

Mr. BAREFOOT. I would characterize that as the principal reason; yes.

Mr. STETTNER. The bylaws provide for a $25 a year membership, as I remember it, which would give you a total budget of $25,000, give or take, annually. How large a research effort do you fund?

Mr. BAREFOOT. Well, most of the work that we do, whether it is in research or any other area of the association, it is a volunteer effort and we just don't have the funds for large outlays of research. We don't have that kind of income.

Mr. STETTNER. I have had occasion to try to contact your APA officers who are listed on your letterhead, and I notice their addresses are all over the terrain. Is there such a thing as a permanent organization? Does it have a permanent staff? What is its size?

Mr. BAREFOOT. Well, certainly we have a permanent organization. We do not maintain a permanent national office if that is your question. Our publications have an address in Maryland. Our secretary's address is Minneapolis, Minn. Our executive director's address is Lafayette, Ind. We do not have a paid staff if that is your question.

Mr. STETTNER. You mentioned that you did have research. What proportion of your budget goes for research, inasmuch as research apparently is so necessary in this field to establish credibility, to establish the validity and reliability of the work that is being done with these instruments?

Mr. BAREFOOT. It would be a minimal amount because here again it is a volunteer effort. The people who are conducting the research are doing it on their own time and at their own expense.

Mr. STETTNER. Are you familiar with the research that is being done other than through your own organization?

Mr. BAREFOOT. Yes, sir, we attempt to keep abreast of it. In fact, much of it is included in the booklet.

Mr. STETTNER. You and a previous witness referred to a comparison recently made, in a study funded by one of the agencies of the Government, comparing the polygraph and other types of instruments. Would you care to expound on the results of that study?

Mr. BAREFOOT. I am, just from a personal standpoint, I am aware and I believe this was a study conducted by the Department of the Army. It was conducted for them by Dr. Kubis out of New York, comparing the polygraph with the PSE. And it is my understanding—and I can't say that I read this thing completely—but it is my understanding that the conclusions reached in that study were that the PSE

did not begin to measure up to the level of accuracy and reliability that the polygraph has. That was the Army's conclusion. That is my understanding of it.

Mr. STETTNER. I have no further questions, Mr. Chairman.

Mr. MOORHEAD. Let me ask one final question of you. Going back to the quotation on page 30 that Congressman Erlenborn brought up: "The polygraph is neither devil nor angel. It is simply one of man's tools and can be used wisely or misused." Now would that statement not also apply to the lie detection instruments that can be done without the knowledge of the subject?

Mr. BAREFOOT. I would say that that would be a fair statement.

Mr. MOORHEAD. Mr. Kronfeld?

Mr. KRONFELD. Just one recap question. As I understand it, the APA has no full-time employees, no full-time staff and your budget is $25,000 per year, and you do not engage in any independent research but merely research by members on a voluntary basis?

Mr. BAREFOOT. Well, no, I think that is a little contradictory isn't it? I mean, what do you characterize as independent research?

Mr. KRONFELD. Research from outsiders, not connected with the organization itself such as the Kubis report for instance. I am just trying to establish how big the APA is and what it is.

Mr. BAREFOOT. All right, I think I would just have to say that we have never had the funds to participate in an outside research project, that the research that the APA has conducted has been by its own research committee and primarily has been on technique and instrumentation.

Mr. KRONFELD. That is my only question.

Mr. STETTNER. And promoting the practice of polygraph as a profession, organizing, setting up professional standards, self-generation, isn't that a purpose of your organization? This committee, or rather the predecessor committee, recommended about 10 years ago that supervisory polygraph operators include physicians and psychiatrists. Your levels of education don't begin to approximate that level, do they?

Mr. BAREFOOT. No, they do not and I could not agree with the conclusion reached by the other committee. That is one area that I would have to take issue with.

Mr. MOORHEAD. Mr. Barefoot, I don't know whether I asked you this or not but are you willing to answer questions submitted to you in writing?

Mr. BAREFOOT. Yes, sir, I would be happy to.

[The questions and answers follow:]

QUESTIONS FOR J. KIRK BAREFOOT

Question 1. What types of problems involving unethical operations of polygraph operators have been experienced in the past that have made necessary the cited attempts to encourage a more proper climate?

Answer 1. The formation of the American Polygraph Association (APA) and much of what has been done to encourage a more proper climate or professional environment in conducting polygraph examinations, grew out of the Moss subcommittee hearings of 10 years ago. The APA is not aware of unethical operations of polygraphists of that era except for unsubstantiated charges leveled by former Congressman Gallagher and others of 10 years ago. Of the relatively few grievances received since the formation of the APA, most have been found to have little or no merit. However, with respect to those that have been found to have merit, appropriate disciplinary action has been taken by the APA.

THE POLYGRAPH TECHNIQUE

Dedicated to Man's Right To Verify the Truth

J. Kirk Barefoot, Editor

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On July 23, 1968 the Lexington, Massachusetts branch of the Arlington National Bank was held up by three men, one of whom fired a shot from his pistol. Later, suspects were arrested and three tellers positively identified one man as a participant in the robbery. According to Lexington Police Captain James J. Lima, "Based on circumstantial evidence and this positive identification, the suspect would have unquestionably been indicted, tried and convicted." The maximum penalty in Massachusetts for armed robbery is life imprisonment. . . .

A worker in Akron, Ohio lost his job after a plant guard accused him of stealing company property. The man's union, believing the case against him was too strong, refused to go to bat for him. . . .

A worker in a major mail-order warehouse in the Midwest was handed a piece of jewelry, belonging to the company, by a fellow employee. The transaction was observed. The fellow employee was searched on the way out at the end of the day; another piece of jewelry was found and she was dismissed. The first employee, on being checked the following morning, said she had returned the item, but signed a statement admitting she had "done wrong," on the basis of which she was fired. . . .

Often, it's the principle of the thing. Two Oklahoma men, long-time employees of the Bell System, were fired for shortages of less than $3 in a coin telephone box. . . .

All these stories have the same happy endings: The accused persons were cleared on the basis of polygraph, or "lie-detector" examinations. Shortly after the Massachusetts man was released from custody, another suspect confessed. The man from Akron was cleared when the accusing guard's story developed discrepancies while his own polygraph test indicated he had no knowledge of the crime (the guard refused to take a test). The lady fired for accepting the stolen piece of jewelry went to her union and said she had signed the damaging statement because she was "scared." Union and management agreed to abide by the results of a polygraph exam; the exam showed the woman had not stolen, and she was reinstated. The case of the two telephone workers is still in arbitration, but their lawyer has every confidence they will be reinstated--thanks to polygraphic evidence that indicates they are completely innocent.

What isn't so happy is the fact that three of these four innocent persons might never have been cleared of suspicion--if certain misguided leaders of organized labor had their way. The first case was a police matter, and police departments the country over, rely on the polygraph as a dependable indicator of innocence or guilt. In the other three cases, no criminal prosecution was involved; but in each, jobs and reputations were on the line, and in each it was the polygraph that established the truth. Given these cases--and thousands more like them--it seems strange that union leaders, who supposedly have their members' best interests at heart, have launched a campaign against the polygraph that all but equates it with the medieval torture chamber.

Losses resulting from theft from American business and industry total more than $4 billion annually, according to expert estimates. Authorities agree that 60 to 75 percent of that total is chargeable to employee-related theft (as opposed to theft by such outsiders as burglars and shoplifters). The Small Business Administration estimates that theft is the principal cause of business failure in over 50 percent of bankruptcies. Both large corporations and small businesses are usually able to absorb theft losses only by raising prices, thus passing a large part of the loss on to the consumers--the American public.

America has experienced great shifts in population since World War II: Ours has become a mobile society. Job applicants no longer generally come from an employer's immediate community; thus the employer must screen prospective employees. Unfortunately, most employers are reluctant to release derogatory information about former employees out of fear of lawsuits. Consequently employers have come to put little faith in the traditional reference letters because they themselves refuse to be candid in responding when such questionnaires reach their own desks.

Most police departments and the FBI do not make their criminal files available to the private employer. Many companies have found that the so-called background investigation conducted by private agencies is often next to worthless and reveals little that is not already known to the employer. Such investigations are particularly susceptible to influence by malicious neighbors, vindictive past employers or disgruntled former fellow workers. Clearly, such a procedure is inadequate from the employer's view; equally important, it is fraught with the danger of injustice to the job applicant.

Some segments of organized labor have given little more than lip-service to the growing problem of employee dishonesty. Instead of undertaking educational programs, organized labor often makes public statements condemning dishonesty while many of its locals attempt to thwart employers' attempts to control thievery. They have attacked the use of closed-circuit television, undercover investigators and criminal record checks, and have directly interfered with internal investigations by employers, by advising employees of "their rights." In the face of such opposition, many employer investigations have been stopped cold. The union argument that these are matters for the police to handle is less than sincere: Labor unions know all too well that most police departments have neither the manpower nor the specialized abilities to delve into the intricacies of a company's pilferage problem.

As a result of these hard realities, many employers have turned to the polygraph to screen job applicants and to aid in internal investigations. It is interesting that the use of this technique over the past twenty years has increased in direct proportion to the rise of employee theft. Organized labor's opposition to this trend has ranged from demands at the bargaining table to attempts to secure adverse legislation at both the state and federal level. So far, labor has had less than satisfactory success. A few companies that were not polygraph users have agreed to contract prohibitions, and in approximately twelve states laws have been enacted against polygraph use, ranging from restrictive measures to outright prohibition of the technique for businessmen. Labor-sponsored attempts against the polygraph have been defeated or vetoed in approximately the same number of states. Fourteen other states, how-

ever, have taken a more positive step by enacting legislation for licensing and control of polygraphists.

Labor's basic argument against the polygraph is that the technique is invalid, unreliable, and smacks of witchcraft. But the fact that polygraph usage continues to grow certainly suggests that it must be producing results for the business community.

Because some of labor's "expert witnesses" against the polygraph have reversed their opinions in recent years, labor now feels it must take a new tack--now it charges that use of the polygraph involves violations of the Fourth and Fifth Amendments to the Constitution: the protections against unlawful search and against self-incrimination.

In order to answer these and other charges, and to present a factual account of the use of the polygraph today, the American Polygraph Association, in cooperation with the National Committee for Employee Integrity, offers this report.

RIGHTS AND WRONGS

A. *Constitutional Rights*

Opponents of the polygraph claim the employee or job applicant should have Constitutional protection against self-incrimination; should be able to "take the Fifth Amendment" when a question as to his honesty arises. Of course, the question of the Fifth Amendment is moot in the employer-employee relationship. Unlike the accused criminal, who might otherwise be forced to testify and thus face imprisonment, the employee or job applicant may refuse to take a polygraph test. He is not in a court of law; he has a choice in the matter. *It is also significant that physiological tests similar to those made by the polygraph--for instance, blood tests, alcohol tests--have always stood the test against self-incrimination.*

Opponents further charge that the polygraph test violates the subject's right to privacy, including his right to conceal past criminal activities. Under the Common Law, the right to privacy protects the individual only against unwarranted intrusions by the state. An employee or prospective employee can be give a polygraph examination only with his knowledge and consent.

The First Amendment right of free speech is given a bizarre twist by anti-polygraph forces, who expand it to include the right *not* to speak. The Ninth Amendment is also trotted out: "The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people." But this argument applies just as well to other rights, such as: the right of a citizen falsely accused of a crime to gain release or avoid prosecution through the truth-verifying polygraph examination; the right of a falsely accused employee to avail himself of a polygraph test to protect his job; the right of the businessman to protect his assets against internal thievery; the right of the polygraphist to earn a living in his chosen profession.

B. *Personal Rights versus Public Rights*

The right to privacy as guaranteed by our Constitution is indeed a sacred one and must be guarded and respected. But in a free society, no person's right is absolute; it must give way, to a degree, to the rights of others. The right of the public to protect its business places, its job security, its hard-earned wages, and its health, safety and welfare must be weighed against the right of the job applicant or employee to conceal undetected criminal behavior, dishonesty, and material misstatements of fact.

Reasonable people agree that the businessman has both the right *and the obligation* to inquire about the experience, skills, physical well-being, character and honesty of job applicants. He also has not only the right, but the obligation to utilize the most effective methods available for obtaining and verifying this information. Reasonable people will also agree that the honest working man has the right to the job security and pay increases that accompany business profits, as well as security against exposure on the job to the criminally inclined. Crime on the streets is bad enough; why expose good men and women to crime on the job?

Finally, everyone will agree that the consumer has the right to be protected against higher prices caused by the "theft tax" now estimated to cost the working public more than $3 billion each year *in the form of increased costs which must be passed on to the consumer.*

The facts show that an examination conducted by a competent and ethical polygraphist is both a reasonable and an effective technique for protecting public rights. It should not be used for frivolous matters, and it should not be used for unethical probing into personal questions of sex, religion, or politics that have no bearing on the issue under examination. Violations of ethical considerations in the use of the polygraph should be prosecuted vigorously in the public interest. Legislation which would license and regulate the use of the polygraph, and would require such prosecution, would protect the rights of all the public. Labor has consistently opposed and obstructed efforts to protect the public rights and the personal rights *of all citizens* by this means. Instead of "personal rights," are these representatives of labor really not advocating *"the right to lie, cheat and steal without discovery?"*

Reasonable and honest people can supply their own answer without our help!

Labor's Various Attitudes

Officially and to the public, labor says: "We do not condone dishonesty and will cooperate whenever proven dishonesty is shown to exist." Commendably, a few union locals around the country will even assist in rooting out thieves, but these are the exception rather than the rule. The key word in the unions' official position is the word "proven." It is true that most locals will not fight against a case of "proven" dishonesty; the problem is to prove it in the face of union obstruction. In many companies utilizing a pre-employment polygraph program, the unions have attempted to coerce the employer into dropping the program. In other companies using the same screening program, but having the probationary period, shop stewards have been known to tell new employees: "Don't steal anything until after your lie-detector test." Upon learning of an internal investigation in progress, most business agents will call a meeting of the employees to "give them their rights." This usually involves dispensing such pieces of advice as:

--*"If you are called in for questioning, demand that your shop steward be with you."*
--*"Don't admit anything or sign any statements."*
--*"Don't agree to return any stolen company property you may have at home."*
--*"Don't sign anything."*
--*"Don't take a lie-detector test. If you volunteer for a lie test, you will be expelled from the union."*

To discourage employees from cooperating with management during investigations, many union by-laws or oaths include prohibitions against testifying or informing on fellow members.

Many union publications, notably those of the Teamsters, Retail Clerks International and the ILWU, regularly carry news articles or editorials against

employer-conducted investigations.* A favorite target of such articles is the company security officer, who is depicted as an expert on the "frame-up" and given such choice names as "pig," "illegal gumshoe," "company gestapo," "lackey of the front office," "tool of the bosses." Such articles actually foster a climate for theft among employees. Nowhere in these publications do constructive articles appear--ones that attempt to encourage employee honesty.

D. *Reliability of the Instrument*

In their publication "The Lie-Detector, Guilty until Proven Innocent,"** the unions concede (see, for instance, page 20) that the polygraph can measure and record such various physiological phenomena as pulse rate, blood pressure level, respiration rate etc. *As the unions correctly point out, the instrument itself does not detect lies, it is merely a device that measures and records certain physical phenomena.*

The name "lie-detector," popular with the news media but seldom used by modern-day polygraphists, is a misnomer. Because of sensational publicity arising out of its use in criminal cases, the public has a false picture of an instrument that flashes lights, rings bells or gives some other dramatic reaction when a lie is told. This impression could not be farther from the truth. The work of the polygraphist might be likened to that of the radiologist reading an X-ray picture or the cardiologist interpreting the tracings of an EKG. If there is such a thing as a "lie-detector" or "truth-verifier," it must be the polygraphist himself.

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* See Appendix 4.

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THE POLYGRAPH TECHNIQUE

A. *History and Development*

The history of civilization is filled with attempts to detect lies and to verify the truth. Ancient methods of detection included the Ordeal of the Boiling Water, the Ordeal of the Red-Hot Stones, the Ordeal of the Sacred Ass and the Ordeal of the Red-Hot Iron. Often, methods which to modern eyes appear to be based on pure chance were employed. For instance, truth or the lack of it might be determined by the throw of a knife, or the pattern assumed by a handful of tossed pebbles. Though some ancient tests reflected a shrewd understanding of psychology or physiology, they were hardly reliable or scientific.

The earliest scientific approach was developed by the Italian criminologist Cesare Lombroso, who in 1895 conducted experiments in the detection of deception by attempting to record, with a device called "Lombroso's Glove," changes in the subject's blood pressure. Unfortunately, Lombroso's principal interest was in the area of criminal identification through physical characteristics; therefore, he never followed through on his experiments. Mosso, another Italian scientist, conducted further investigations of blood-volume changes during deception tests by using a crude device known as "Mosso's Cradle."

Around the beginning of World War I a third Italian, Vittorio Benussi, conducted experiments in lie detection with a device that measured and recorded the rate and depth of the subject's respiration. These experiments convinced Benussi that distinct changes in the respiratory pattern occur during attempts to deceive.

Italian scientists were not the only investigators who contributed to the theories that underlie present-day polygraphy. A Russian, A. R. Luria, made significant contributions. Although he did not use an instrumental approach, many of his theories of the psychology of deception are embodied in polygraph procedure. Luria wrote in 1932:

> *The criminal is certainly far from being indifferent to his experiences; but, on the contrary, he puts himself in an active relation to this experience; its trauma, urging him into activity, conditions the dynamics of his behaviour.*
>
> *The acute state of the trauma, complicated by the necessity of concealing it, bound in by the fear of expressing itself, creates in the criminal a state of exceedingly acute affective tension; this tension is very probably exaggerated because the subject is under the fear of disclosing his crime; the more serious the crime, the more marked the affect, and the greater the danger of disclosing it, the more this complex is suppressed, the greater the tension.*
>
> *The suppression of the complexes is here truly insufferable, and the subject experiencing them is certainly not in a condition to remain passive*

during the course of this affect; he must orient himself in such a way that he discharge the tension and save himself from an external play of excitation, which upsets all of his behaviour and keeps him incessantly under the fear of detection.

The first American to become directly involved in the field of lie detection was Dr. William M. Marston, a psychologist. He was commissioned by the United States Government to devise a method for the interrogation of prisoners of war during World War I. Using a sphygmomanometer, the device physicians use to take the patient's blood pressure, Marston conducted experiments by taking intermittent readings of blood pressure during interrogation periods.

In 1921, inspired by the success of Marston's endeavors with prisoners of war, Chief August Vollmer of the Berkeley, California Police Department encouraged Dr. John A. Larson, a psychiatrist, to develop what became the forerunner of the modern-day polygraph. Although large and cumbersome, Larson's instrument made the first continuous, permanent record of the three phenonmena: blood pressure, pulse, and respiration. This original polygraph was used for many years by the Berkeley Police Department and enabled Larson to identify correctly many hundreds of criminals, as well as thousands of innocent persons who had been suspected of crimes.

Because of the amazing record built up by Larson and his original polygraph, a young psychologist, Leonarde Keeler, became interested in the technique and developed his own apparatus. His instrument had the added feature of measuring changes in the skin's resistance to electricity, commonly known as "galvanic skin response." It is Keeler who is generally recognized as the true pioneer in the field of modern-day polygraphy. He not only refined the technique in its application to police work, but also pioneered its use in wartime and was responsible for its introduction into the field of business and industrial security. As we shall see, Keeler also aided the progress of polygraphy by teaching the technique to many others.

B. *Validity and Reliability*

In April 1963 a subcommittee of the House Government Operations Committee, under the chairmanship of John E. Moss (D., Calif.), undertook an investigation of polygraph use by the Federal Government. Two years later a report was adopted. The subcommittee concluded: *"There is no 'lie-detector,' neither mechanical nor human. People have been deceived by a myth that a metal box in the hands of an investigator can detect truth or falsehood."* These conclusions were accepted despite the fact that two of the subcommittee's own witnesses, recruited from the scientific community, Drs. Martin Orne and Joseph Kubis, had testified that they had achieved accuracy as high as 80 to 90 percent in their research. The subcommittee also disregarded (or was unaware of) a mass of additional laboratory investigations of the polygraph.

The views of then-Representative Robert P. Griffin, a member of the subcommittee and now United States Senator from Michigan, are interesting:

Although the subcommittee hearings have pointed up some questions concerning the use of the polygraph, and have revealed deficiencies in the

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the qualifications of some polygraph operators, the record does not justify the general tenor of the report which tends to discredit the polygraph and its use.

The undersigned is aware, and credits qualified polygraph operators with an awareness, that a polygraph merely measures certain identifiable physical reactions such as respiration rate, blood pressure, pulse rate and galvanic skin response.

The usefulness of the polygraph depends upon the skill and training of the operator. The hearings did reveal a need for improvement in the training and qualifications of polygraph operators in some of the government agencies.

The polygraph should not be relied on exclusively. However, if it is used properly by a well-trained operator who recognizes its limitations, the polygraph can be a valuable aid.

The undersigned does not join in the sweeping recommendation that the polygraph should be prohibited "in all but the most serious national security and criminal cases." *However, he does agree with most of the other recommendations, and particularly with the finding that there is need for more research to document the validity and reliability of polygraph examinations.*

Also interesting is the subcommittee's recommendation, cited by Griffin, that the polygraph should be used "in the most serious national security and criminal cases"-- an implicit recognition of the instrument's effectiveness, and a puzzling denial of a valuable method of proving truthfulness to the average citizen.

To give some idea of the effectiveness of the polygraph technique, a few statistics will be necessary. High validity was reported by Lykken in two experiments in 1959 (1) and 1960 (2), in which accuracies of 89 percent and 94 percent were obtained. Marston, employing a mock crime, reported 94 percent correct judgments of the actor-subjects (3). The vast majority of other investigations have yielded similar figures: Ellson, 73 percent (4); Baesen et al., 86 percent (5); Thackray and Orne, 86 percent (6); Kubis, 97 percent (7) and Ruckmick, 83 percent (8). Only in relatively rare instances has low accuracy been reported in the literature--for instance, by Landis and Wiley, who obtained only 50 percent correct judgments in a study they did in 1926 (9).

While the accuracy obtained in experimental situations is most impressive, it is not as high as that reported by polygraphists for real-life situations. Virtually all polygraph examiners quote validity statistics of about 90 percent. This is understandable, given the differences between laboratory and field research. A number of theories exist that explain why the polygraph is effective, of which the fear-of-punishment theory is perhaps the best. It is hypothesized that the greater the consequences of being detected, the greater is the fear of detection. The increased fear in turn triggers greater physiological changes, thereby creating a greater likelihood of detection. It is, therefore, not so much the lying or guilt feelings that alter

the subject's physiological responses, but rather the fear of punishment. A volunteer subject in a laboratory experiment, in contrast to a criminal suspect, has very little punishment to fear; without the drastic fear and stress, the physiological changes associated with lying are reduced, resulting in lowered accuracy levels. This has been substantiated by Gustafson and Orne (10), who found that the more motivation there was to deceive, the more readily the deception was detected. Larson reported that once a confession had been obtained, the physiological changes in response to critical questions were not so great as before (11).

A number of other factors (reported by Abrams (12)) further reduce the validity of the polygraph in the laboratory, and explain the higher percentages of correct judgments reported by the in-the-field polygraphists. Virtually all polygraph experts agree that a well-trained and experienced examiner will make correct judgments in 90 to 95 percent of those cases in which he makes a definite decision. There will always be a number of subjects regarding whom no definite conclusion can be reached, for certain medical or emotional reasons.

In studying the statistics yielded by actual polygraph examinations, the researcher is handicapped by his inability to rigidly control the investigation. Many polygraph judgments simply cannot be verified. When verification is available, however, the accuracy level is quite high. Orlansky, in reviewing the results of government pre-employment security screening, found that correct judgments were made in 95 to 97 percent of the cases, while definite failure occurred in only 0.1 percent (13). Studying the results obtained by two large government agencies which had administered more than 100,000 examinations Chatham reported a proved margin of error of less than 1 percent (uninterpretable records did not exceed 2 percent) (14). (In 1932, Larson tested ninety college girls to determine which of them had been stealing in their dormitory. He correctly classified the 89 innocents and the one guilty girl, for a level of accuracy of 100 percent) (15). Inbau and Reid examined 4,280 criminal suspects and obtained accurate findings in 95 percent, errors in 1 percent and indefinite ratings in 4 percent of the cases (16). In observing law enforcement agencies, Levitt indicated that correct interpretations were made in 75 to 100 percent of the instances (17). Wolfle, in a report prepared for the Emergency Committee on Psychology of the National Research Council, stated that 80 percent of polygraph evaluations were accurate; 3 percent in error; and 17 percent indefinite (18). Studying the validity of the polygraph examinations administered over three years at the Chicago Scientific Crime Detection Laboratory, Trovillo found errors in only 2 percent of the cases (19).

From this partial list of research findings, it is evident that the polygraph can be a highly valid technique. But validity--that is, the degree to which the test measures what it purports to--is not in itself sufficient. There must be high *reliability*--the extent to which a test produces consistent or reproducible results--as well. For the polygraph to be reliable, two or more examiners should be able to obtain comparable results on the same case, or a number of examinations of the same individual should produce identical results.

While there has been less investigation of the reliability of the polygraph than of its validity, the results are nevertheless impressive. Kubis, comparing the judgments among different polygraph raters, found consistency

between 72 and 87 percent (6). An average of 85 percent reliability among judges of polygraph records was reported by Bitterman and Marcuse (20). Abrams and Weinstein, in investigating the effectiveness of this technique with a broad range of retardates, found low validity but high reliability among four polygraphists (21). In another study of reliability, Van Buskirk and Marcuse found 94 percent agreement on polygraph charts between two judges (22). Kubis obtained an average of 79 percent agreement among raters some years ago (7), and the same degree of reliability was reported by Barland and Raskin in a more recent investigation (23). An excellent experiment carried out by Horvath and Reid, employing verified polygraph charts from actual criminal cases, demonstrated high reliability (24). They found inexperienced examiners were accurate in an average of 79 percent of the cases, while experienced polygraphists were successful in 91.4 percent of the forty cases studied. This degree of agreement among the examiners was obtained without benefit of observing the examinations or having any background knowledge of the subjects.

Many students of the polygraph have urged that polygraph evidence be made admissible in the courts. According to Merker, ". . . as far back as 1952 there was general scientific recognition that the polygraph possesses efficiency and that reasonable certainty can follow from polygraph tests. . . . The time has come for the courts to admit polygraph tests into evidence on behalf of a defendant in a criminal case" (25). Hardman adds: ". . . a high percentage of the witnesses on the stand not only lie but escape detection by the traditional methods of examination. . . . No reason is seen why courts generally should not bestow approval. For within /certain/ limits . . . the possibility of error inherent in the present-day use of lie detectors seems outweighed by the opposing possibility of closing the door to truth" (26).

Opponents of the polygraph are quick to point out that no polygraphist or polygraph agency is able to "prove" claims of 90 to 95 percent accuracy. The reader must recognize the difficulty of obtaining meaningful statistics in real-life situations. The principal problem is getting verification of the polygraph examination administered; this can only be done when a confession is obtained. In a case where there are ten suspects and nine of them are cleared by the polygraph and the tenth confesses, then an accuracy of 100 percent can be claimed for all ten. On the other hand, if only nine are tested and the tenth is not examined and cannot be proved guilty, then there is no way to verify the findings on the first nine; consequently they cannot be included in any statistical analysis. Moreover, if the tenth man were available for testing but made no admission of guilt, then all ten would have to be discarded for statistical purposes. *In actual practice, far more innocent persons than guilty persons are tested by the polygraphist, and in many cases the guilty person is never discovered. Thus there is no way to verify the findings on the innocent persons.*

The polygraph profession is aware that much of scientific data on the instrument has been obtained from empirical observation. But this is hardly a good reason to disregard the findings. While rigidly controlled experimentation is difficult to carry out in real-life situations, there is movement in that direction. Validity and reliability studies based not in the laboratory but in the field are in progress at the present time.

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THE POLYGRAPHIST AND HIS TEST

A. *The Profession*

As we have seen, the polygraph technique had its beginnings in law enforcement in the Berkeley Police Department back in 1921. Since then, its use as an aid in official investigation has spread throughout the country, not only to large police departments but to medium-sized and small ones as well. Police officials agree that tremendous savings in manpower and money have resulted from the use of the polygraph technique to pinpoint criminal suspects and to clear innocent persons. The biggest beneficiary of the polygraph has probably been the average citizen. Most police departments, placing great faith in the technique, will not press forward with the prosecution of a suspect who, though a prime candidate because of circumstantial evidence, has been cleared by the polygraph. *It cannot be emphasized too strongly that thousands and thousands of Americans have been released from police custody and spared public prosecution because their innocence has been verified by the polygraph. Moreover, not a single case has been found in which an innocent person was convicted because of polygraph error.*

The Federal Government entered the polygraph field in the early 1940s when Frank A. Seckler, a Secret Service agent, was dispatched to Chicago to learn the technique from Leonarde Keeler. Seckler was the forerunner of more than a thousand federal employees who were to follow. Initially the training of government polygraphists consisted of two or three months' training under the personal direction of Keeler himself. Later the training was formalized when Keeler established what is still known as the Keeler Polygraph Institute in Chicago. In the 1950s, a military polygraph school was set up at Fort Gordon; today it trains the vast majority of military and government examiners, and is rated one of the top polygraph institutions in the country by the American Polygraph Association.

The area of greatest growth in the polygraph profession during the 1960s was in the field of private and corporate testing. Most polygraphists in this category are employed either in one-man laboratories or in larger firms that may employ upwards of 35 staff examiners. A few large corporations have found it economical to employ their own in-house polygraph staffs, but such company examiners probably total no more than a hundred.

Some three thousand persons have been trained as polygraphists over the years; it is believed that there are about 1,200 in active practice today. Approximately eight hundred are members of the American Polygraph Association. The majority of the rest belong to state associations, some of which are affiliated with the APA. The Association estimated that these 1,200 polygraphists will administer between 200,000 and 300,000 tests during 1972 (these figures include tests of all kinds, including those by law-enforcement agencies). Better than 60 percent of the persons tested will be found truthful and cleared of false accusations or unjust suspicions. *This means that more than 120,000 men and women have a very personal stake in preserving the polygraph technique this year alone, so that their reputations, jobs and the public safety and welfare, can be protected against those who favor the personal "rights" of the criminally inclined.*

Industries served by polygraphists are for the most part in the distribution, retailing and service categories. Among them are armored car services, airlines, retail and wholesale drug companies and drug manufacturers, department and other retail stores, the trucking industry, private guard services, restaurant chains, hotels, banks and brokerage houses, automobile rental firms, wholesale and retail liquor dealers, vending machine companies and finance companies--all businesses where large amounts of cash or valuable merchandise may present irresistible temptations. The majority of such companies would use pre-employment polygraph screening; some would use the polygraph technique only in investigating specific instances of theft; a few would use it in periodic screening of currently employed persons. Some firms use two of the above approaches; some, all three.

B. *The Test*

In private testing for commercial firms, examinations are given either "on location" or in the polygraphist's own private polygraph suite. On-site examinations are almost always administered in a private office or conference room. The setting should be private and generally free from all distracting influences. The normal background noises to which the employee may be accustomed, however, are not considered an unfavorable influence on the test.

When the examinations are administered at the polygraphist's own laboratory, however, extra measures are taken to insure that no distractions are present because here the examinee is in an unfamiliar environment and can more easily be distracted than on his home ground. Therefore, the person to be examined will usually encounter a scene something like this:

The polygraphist's waiting room is usually similar to the waiting room of any professional person such as a doctor, dentist, psychologist, etc. The decor of the waiting room is pleasant in nature and may or may not include some plant life, an aquarium, some background music, and reading material. The reading material in some cases may be a mixture of current periodicals along with some reading pieces on the polygraph test itself.

Normally, the person will be greeted by a receptionist upon entering the suite of offices. This receptionist may or may not be in the immediate presence of the waiting room, depending upon the physical layout of the suite of offices. Contrary to charges made by polygraph antagonists, the duties of the secretary or receptionist do not include compiling data on the examinees who are waiting for the test. The end result of the examination procedure will be based on the results of the tests alone and the dialogue between the examiner and the examinee, not upon any impressions of a nonprofessional receptionist.

The examination room itself is more austere in nature than the waiting room. It is almost always devoid of pictures, paintings or undraped windows. It is usually sound-proof in nature and with adequate carpeting on the floor. Normally, the furniture in such a room consists of the examination desk in which the polygraph instrument is recessed, the polygraphist's chair, and the examination chair, which may be of special design. The examination chair may range from an upright chair with what appears to be oversized arm rests, to a modified reclining chair, depending upon the individual preference of the polygraphist. Occasionally, the examination room may also contain a school-room type chair with

writing arm which is used by the polygraphist in conducting his face-to-face pre-test interview.

In some cases, the examination room will also contain a one-way mirror opening onto an adjoining observation room together with a sound system connected to the observation room. The purpose of the mirror and the sound is for the training of polygraph interns and is no different in purpose from similar setups found in psychological testing laboratories and medical schools. Where such an arrangement is present, the examinee is so advised in the written release which he is requested to sign. In the event that the examinee should find the mirror and the sound objectionable, the polygraphist can render them inoperative.

Upon entering the examination room, the examinee is usually introduced to and greeted by the polygraphist. Normally, he will be asked to sit in the examination chair and, depending upon the preference of the examiner, the examinee may be at that time immediately connected to the attachments of the instrument. These attachments, if connected immediately, are not activated during the pre-test interview. Other polygraphists prefer to conduct the pre-test interview prior to placing the attachments on the subject.

The first attachment that the examinee should expect to encounter is the blood pressure cuff, which is identical to that used by the physician, and which is attached to either the upper arm, the forearm, or in some cases the wrist. During the actual examination, this cuff is inflated to a median pressure between the subject's systolic and diastolic blood pressure levels. Some persons report a mild amount of discomfort during the period of inflation, none of which is actually painful.

The second attachment consists of one or two rubber tubes which are placed around the trunk of the body. If only one tube is used, it is placed over the area of greatest movement during the respiration cycle. In some cases, two rubber tubes are used simultaneously to cover the upper and lower chest areas. The tubing is not uncomfortable in any way and simply measures and records, through the instrument, the rate and pattern of respiration.

The third attachment is usually placed on either one or two fingers, or through a dual connection with the palm of the hand. This attachment measures the changes in electrical resistance of the skin. There is absolutely no feeling of discomfort with this attachment.

C. *Techniques*

It is not the purpose of this manuscript to serve as a definitive technical paper on the various types of test used by polygraphists. It should be sufficient to enumerate the different types of tests the average layman is apt to encounter. For a technical review, the reader is referred to the literature of the field and to brochures published by the various polygraph training schools.

Major types of techniques are:

1. The Reid Control-Question Technique

3. The Arthur Technique
4. The Keeler Technique
5. The Integrated Control-Question Technique
6. The Hanscom Technique

The above techniques are generally used in what is known
tests--that is, where a loss has occurred or a crime has been c
differ in relatively minor procedural areas but are basically alike
tion to the psycho-physiological essentials. It is important for the reader t
realize that most of the above techniques contain built-in safeguards for the
person taking the test. One example of such a safeguard would be the use of a
"guilt complex" question which is designed to identify the very rare person who

control question is one designed to create the probability that the subject will
lie, or at least be unsure of complete truthfulness of his answer. It should be
a question which is of no great significance and not particularly g
issue at hand. The examiner can utilize the response to a control
comparison purposes to responses or lack of responses to relevant q
the test. It is in this way that deception is detected. Even more
truthfulness to relevant questions can be verified. Obviously, the use
a question precludes an individual who is physiologically or psychologically in-
capable of responding from successfully passing the test
this type, the verdict of the polygraphist would be "inc
sult simply means that it is the same as if no test had been administered.

One of the oldest type of tests, but still probably the most reliable
when administered under proper circumstances, is the so-called Peak of Tension
test (P.O.T.). This is more commonly found in police testing and is used in
conjunction with and as a follow-up to the earlier ment
testing. The most commonly used P.O.T. test is based o
crime which can only be known by the perpetrator. As long as there is no
commission are made known, it will be pos
An example of the P.O.T. test would be where the qu
iber of the gun that was used in the commission of
the caliber of the gun would be known only to the perpetrator, and therefore
suitable questions could be framed using various gun calibers. The P.O.T. test
is infrequently used in private testing as the types of situati

D. *The Control Test*

In order to aid in getting the examinee accustomed to the instrument,
and also to develop some insight as to the reaction pattern of the person

rest likely to be encountered is a situation where the examinee has been re-

ject knows why he was selected. The subject is then requested to answer

f the answers are "no," one answer is a lie. Each
subject has his own way of responding to deception while attached to the poly-

The bulk of the work of the private polygraphist is divided between the periodic test and the most widely used, the pre-employment test. In the period-
employees, questions are limited to a narrow
ling of merchandise or money of the em-
ions are usually prefaced with "Since your last polygraph
___?" These tests are usually very narrow in scope as there

est accounts for the vast majority of all tests
today. As such, it has probably become the most
overkill of all the tests given, and is probably the chief target of

or discussion between the examiner and the examinee
Of the typical hour-long pre-employment test, 40
hat is called the pre-test interview. It is during
rview that the examinee's background, medical history and present
condition are reviewed, in relation to the questions to be asked. The
n an opportunity to explain any situations in his past
f the wording of the questions. For instance,
tion might be "have you ever been convicted
e age of nineteen he had been
ded guilty. If this be the case, then
ly be used and would require a rewording.
utely essential, and a review of the questions

n consists of two or more tests. Each
welve questions (in the case of wrist-type
nty questions might be asked.) Each test
was about three to four minutes. Irrelevant questions are normally inter-

spersed with relevant questions and also at one or two strategic points in the examination the control questions are asked. Irrelevant questions are intended to be completely neutral to the examinee--questions such as "is this the month of February?", "is your first name John?", "is your last name Smith?", "are you wearing a tie?", "are you in New York City at the present time?", etc.

Relevant areas of inquiry in a pre-employment examination are selected by the client and usually fall within the following scope: deliberate falsification of application; deliberate falsification of medical history; illicit use of dangerous drugs or narcotics; thefts of cash from former employers; theft of merchandise from former employers; being discharged, or forced to resign from a previous job; significant trouble while in the military; serious unsolved criminal offenses; criminal complaints and convictions; and in the case of a recently hired employee working on a probationary status, thefts from the present employer since employment.

Because polygraph questions must be answered with a simple "yes" or "no," it is quite common that a person undergoing an examination will think of some situation which may or may not be directly relevant to the issue, but which is triggered in the thought process by a particular question. Such thought processes will usually reflect themselves in the polygraph tracing and can easily be discussed with the examiner at the conclusion of each run. Normally, at the end of the first run the polygraphist will give the examinee an opportunity to volunteer any information that may have come to mind during the actual run. If nothing is volunteered at that point, the polygraphist will proceed to administer the second run, after which the polygraphist will discuss in detail the polygram or chart with the subject and pointedly inquire as to anything that may have come into the subject's mind in relation to any particular question which produced a response. Any explanation on the part of the subject will simply require further rephrasing or rewording of the question, something along the lines of "other than what you have told me, have you _____?"

Should a subject resort to outright deception, the examiner will discuss it in a frank and candid manner and afford the subject the opportunity to explain the true facts in the area at issue. If an explanation is offered, then the examiner will run one further chart, commonly called a "clearing chart."

F. *Propriety of Questions*

Ethical standards in the polygraph field require the examiner to be very strict in assuring the propriety of questions used. Most examiners will resist the rare attempt by an employer to check areas which are not relevant to the job sought by the applicant. Obviously, each examination is different because of the age and background of the subject, and the nature of the job for which he is applying.

A rule-of-thumb approach to the propriety of questions would follow approximately these lines:

1. A 35-year-old applicant for a supermarket manager's job would in all probability not be questioned about boyhood thefts or even thefts from employers at an early age, especially if the applicant has held

positions which afforded him access to money and merchandise and where it can be determined that he has refrained from such thefts during the past ten years.

2. On the other hand, an 18-year-old applicant for a position involving the handling of merchandise or cash, could properly be questioned as to thefts committed within the past several years.

3. A 17-year-old girl applying for a position as a drugstore clerk would probably not be questioned regarding chronic and excessive use of alcohol but she might very well be asked about illicit drug use.

4. A 30-year-old applicant for a job as an airline pilot would not be questioned regarding his being fired from prior jobs as a teenager but could very well be asked a question concerning chronic and excessive use of alcohol.

In summary then, it is evident that in order to be of real service to his client and the examinee, the polygraphist must use only questions which have some definite bearing on the applicant's fitness for the job. Unless a person is applying for a job so sensitive in nature as to raise the question of possible blackmail, there is no reason for the polygraphist to delve into such highly personal areas as sexual relations or sexual deviation. In the typical pre-employment situation involving commercial business firms, questions of this type are never asked during either the pre-test interview or the test itself.

A. *Employees' Rights and Safeguards*

ment, the unions have dredged up a handful of cases in which the polygraph examination is portrayed as an evil thing that seriously injures the employee. Although these are isolated cases, the implication is made that they are typical of everyday occurrences. *A careful reading of the cases selected, however, will show that if any abuse or misuse of the technique took place, it was generally not the fault of the profession, but simply a misjudgment on the part of the employer in applying the results of testing.* The Dos and Don'ts of the polygraphist's role in the employer-employee relationship have become well-established in the past ten years, and it is only the occasional company that strays from these guidelines. Organized labor's examples of abuse are few and far between, and are in many cases taken out of the context of their times and represented as current evils.

For instance, the Maritime Trades Department devotes six pages to the Zahn Drug Company case as a prime example of abuse of the polygraph. But the propaganda piece neglects to mention that the testing was done prior to 1963; that instrumentation other than the polygraph was used; that because of state licensing and control of polygraph testing, such a situation has not occurred in the State of Illinois since 1963. Moreover, the man identified as the "examiner" is not and has never been a polygraphist, and has not practiced since Illinois undertook to regulate the polygraph profession.

Contrary to the picture painted by labor, polygraphists are by no means indifferent to the rights of the examinees. Most polygraphists have themselves been on the other side of the instrument; consequently most believe in certain employee rights and try to influence their clients to use test results in the proper manner. The employee rights generally accepted by the profession are:

--The right to request and to receive a polygraph test. Many thousands of employees over the years have found themselves under suspicion, and have requested tests on their own initiative. In Massachusetts, however, this right has been denied by the state legislature under pressure from organized labor: The anti-polygraph law in that state specifies that no employer shall "permit" a test to be given to an employee.
--The right to refuse to take an examination without fear of discharge. This right should prevail unless, as a condition of employment, the subject has specifically agreed to undergo testing at any future time.
--The right to limit dissemination of test results.
--The right, written into law in some states such as Illinois and Virginia, to a copy of the polygraphist's report.
--The right to know beforehand the area of inquiry and the exact proposed questions. These matters are always covered in the pre-test interview, and are essential to the accuracy of the examination.

If misuse, abuse or malpractice occurs, the employee has a number of remedies available. These include:

against unions in their organi-
d tests given each year, labor
not produce more than a half-dozen cases in which the NLRB has found that
the polygraph was used as an instrument of unfair labor practices. Indeed, the
American Polygraph Association forbids its members to conduct examinations when
there is reason to believe the examinations are part of an effort to hamper the

most useful defensive tool for the employee is
prosecute a civil suit for damages. The unions, recogni-
y, cite the case of a young Chicago engineer who was awarded
after having been dismissed, partly as a result of a polygraph
t the Maritime Trades Department conveniently forgets is that
e, in large part, by the results of another poly-
of the polygraphist who administered it.
ates which have enacted licensing legislation,

es. Any employee can make a complaint to a state polygraph
graph Association. The APA and the state
s, and welcome legitimate complaints.

Organized labor maintains that the existing machinery for the protection of
e employee is inadequate, and that the polygraph must therefore be outlawed.
If the machinery falls short of doing the job, then the solution is licensing,
not wholesale abolition. Isolated cases of abuse and malpractice do exist--in
sion, just as in the medical and legal professions. Oddly,
i for the abolition of doctors and lawyers.

al security. It is interesting that notwith-
i unions have used the polygraph for a number of years, in
their attention during legislative campaigns in the 1960s, the
r locals had ever used the dread technique. Polygraphists

oratories in the Midwest reveals that

since 1960, local unions have had recourse to the polygraph technique no less than 32 times! Following are the unions (local numbers deleted to save embarrassment) that availed themselves of the polygraph technique.

Case No.	*Date*	*Location*	*Union*
6011	2-60	Chicago	Teamsters
6049	3-60	Louisville	Transit Co. Workers Union
6181	5-60	Chicago	Retail Liquor Salesmen's Union
6277	6-60	Chicago	Teamsters
7311	6-61	Chicago	Joint Board I.U.D.T.W.
7712	10-61	Chicago	United Steel Workers
8010	12-61	Cincinnati	Atomic Trades & Labor Council
8236	2-62	Chicago	Painters Local Union
9979	6-63	Chicago	United Optical Workers Union
11084	6-64	Chicago	District ___, Machinist Union
13264	9-65	Kenosha	U.A.W. Local ___, (Union Official)
13415	11-65	Chicago	Grain Miller Local ___, U.M.W.
13477	12-65	Chicago	D.U.O.C. Local ___.
14499	2-67	Muscatine	Teamsters
16261	10-68	Hammond	Local 2 - -; AFL-CIO
16266	10-68	Illinois	Teamsters' Local 7 - -.
16272	10-68	Muscatine	Teamsters' Local 3 - -.
17141	7-69	Chicago	I.B.E.W., Local 10 - -.
18736	1-71	Illinois	I.B.E.W., Local 14 - -.
18758	1-72	Illinois	United Retail Workers
19249	1971	Chicago	Teamsters' Local ___.
H. Inc.	2-71	Oklahoma	C.W.A. Local 60 - -.
H. Inc.	7-71	Oklahoma	C.W.A. Local 60 - -.
K.C.	2-71	Chicago	Teamsters' Local 74 - -.
Facts, Inc.	12-66	Houston	Teamsters' Local 9 - - .
P.D.	3-71	Wisconsin	U.A.W. Local ___
M.B.	12-71	Louisville	Teamsters' Local ___
M.B.	10-69	Louisville	Amal. Meat Cutters & Butcher Workers
M.B.	2-69	Louisville	Teamsters Local ___
M.B.	3-69	Louisville	United Steel Workers Local
M.B.	5-70	Louisville	United Steel Workers Local
M.B.	11-71	Louisville	International Assoc. of Machinists

Full details of these cases, including Xerox copies of union checks, are on file with the APA. The reports on two cases are reproduced here:

14499: Bandag Rubber Company, Muscatine, Iowa

"This is a case in which the Teamsters Union at first rejected Polygraph testing, but after being introduced to it and understanding what it really was, demanded Polygraph service.

"The case involved employees of the Bandag Rubber Company of Musatine, Iowa. This company retreads automobile tires. The Polygraph testing, which took place at the company, involved an employee or employees abuse of machinery.

"The first case took place in 1967. A person or persons had placed two mill

knife blades into the banbury area mill causing it to 'blow up' when it was started between 3 PM and 3:30 PM on January 10, 1967. The examiner was informed that about 3 AM on January 10th, the motor was shut down so the machinery and plant could be cleaned to 'run black,' and it was not started again until about 3 PM on the same date. It was during this period that the mill knife blades were placed in the motor. Any employee or employees on the three shifts had access to the motor and knives. One of the knives recovered from the motor during repairs had been sharpened by Gilbert Skidmore, and, he apparently was the last person to have handled this knife.

"The company requested that employees take Polygraph examinations to uncover the person or persons responsible for causing the damage to the mill loader. These employees were all members of the Teamsters Union and universally rejected Polygraph examination. However, the company management decided that since this instance of machinery abuse could have seriously injured or killed someone, they would call in a Polygraph examiner to consult with the union members and management as to the Polygraph testing to be done.

"The examiner arrived on the company premises and conferred with the management and union stewards. At this conference, the union steward agreed that it was essential to detect the person responsible for the offense, if possible; but, he also felt that the Polygraph testing was an infringement of employees' rights. However, after this conference, the union steward agreed that all employees who wanted to take a Polygraph test would be allowed to do so, although no one would be required to take such a test. The steward demanded he be allowed to be present outside the testing room while the testing took place in order to advise any employee who wanted to take the test. The examiner and management agreed to the steward's demands and the testing commenced.

"Ten employees were tested and all of them were reported by the examiner as telling the truth in their denial of involvement in the offense. The eleventh employee who was tested was reported by the examiner as not truthful in his denial of the offense, and the examiner reported this to the union steward and the management. At that time, all parties concerned agreed the employee should be told he did not pass his test and be allowed to offer an explanation.

"The examiner then confronted the subject, and the subject admitted to the examiner that he had put two mill knife blades in the banbury area mill motor on January 10, 1967. He explained that about 3 PM on the date in question he took the two mill knives off the top of the motor and threw them into it, because he did not want to do his assigned job that day. He stated further that because he did not get along with his foreman he felt he had ample justification for what he had done. He agreed to repay the company for all necessary repairs.

"At the conclusion of this subject's confession, the union steward and management thanked the examiner and the examiner returned to Chicago."

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"Approximately one year later in 1968, the examiner received another call from the management of the Bandag Rubber Company. He was told they had recently dis-

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covered similar damage to another motor in the same area as that in 1967. Although the damage on this occasion was less than the 1967 damage, employees demanded they be allowed to take Polygraph examination in order to vindicate themselves of any blame in the damage, and to find the person or persons responsible. The employees were in fear of possible death or serious injury by these flying pieces of steel which were thrown into the motor.

"The examiner went to the Bandag Rubber Company and tested four employees. The fourth employee who was tested was reported 'not truthful' regarding his involvement in the machinery damage. Again, the management and union requested that the examiner confront the employee with the findings. When the subject was advised of his examination results, he admitted he was responsible for the damage in question, but he had done it by accident. He was trying to fix the machinery because it was always breaking down and the damage was the result of his trying to properly repair the machinery."

In summary then, it is obvious that regardless of the official AFL-CIO and Teamsters attitudes, local unions have found the polygraph technique not only useful but indispensable in some instances. Obviously, the union's use of the polygraph continues!

C. *What about the Workers?*

An especially eloquent statement of the workers' (as distinct from the unions') point of view was elicited when one polygraph firm asked examinees if they thought polygraph tests should be outlawed (the results, by the way: 72 percent said "no"; 17 percent, "yes"; 11 percent had "mixed feelings"). Said an examinee: "Unless it could be proven to me that these tests are no good I would say leave them be. I believe the companies are trying to weed out habitual thieves. A company I worked for before lost $100,000 in a year because the union (Teamsters) said 'no' to polygraph exams."

It is not difficult to guess the feelings about the polygraph technique held by many other American working people. For instance . . .

--The employees of Zahn Drugs, a large drug wholesaler in the Chicago area, where a union contract was negotiated in which it is stated that "both sides recognize the dangers of drugs to society," and agree to polygraph examinations within certain limits. . . .

--The union truck drivers and warehousemen in a Buffalo, New York warehouse where $67,000 in inventory was lost over an eight-month period, all of whom were cleared by polygraph examination that also resulted in full confessions from the foreman and two accomplices. . . .

--The Massachusetts worker who, because of a past suspicion of dishonesty, was strongly suspected of stealing cash from his employer's office, but was completely cleared by a polygraph examination. . . .

--The veteran foreman at a Phoenix, Arizona auto parts company who was accused by a young employee of selling company merchandise and pocketing the money--and was cleared by a polygraph test, and a subsequent confession by the young

employee during a pre-test interview. . . .

--The six office employees whose boss asked them to take polygraph tests to determine who was stealing large amounts of cash. At first, all refused; then one spoke up and said: "Why should we be patsies and have suspicion on our records for the rest of our lives?" The six took the test, and the most innocent-seeming employee confessed. . . .

When all is said and done, the polygraph is neither devil nor angel. It is simply another of man's tools; as such, it can be used wisely or misused. Scare propaganda to the contrary, it has in the overwhelming majority of cases been used wisely and well--more often, as we have shown, to clear the innocent than to detect the guilty. The American Polygraph Association, and all reputable polygraphists, support adequate safeguards of individual privacy, and reasonable state licensing and regulation to keep out the occasional bad apple that would otherwise spoil the barrel. And surely all intelligent people endorse the right of the innocent to prove their innocence, the right of the employer to protect his business--*and his honest employees*--from the occasional dishonest worker, and the right of the consumer to be spared the extra expense that the businessman must pass along when employee dishonesty becomes a problem.

Why, then, the irrational, not to say hysterical opposion to the polygraph? Why the scare propaganda, the obstructionism and the high-pressure lobbying in the halls of Congress? No one suggests that the anti-polygraph forces *desire* employee theft, pilferage, and the consequent higher prices and general demoralization. Rather, the antis bring to mind a fellow named Ned Ludd. In the early nineteenth century the English textile industry, seized by the Industrial Revolution, began switching from hand-spinning and hand-weaving to machines each of which could do the work of several men. Ned, a young handworker thought to have been demented, saw in this development the end of his job and everyone else's--so he took to smashing the machinery. Others emulated him, and for a time it looked like touch and go for the textile industry. Soon, however, the Luddites subsided and the industry grew so that there were jobs for all; usually at higher wages than in the good old days of hand-work.

The anti-polygraph forces show the same irrational fear of the new and unfamiliar; the same willingness to believe only the worst; the same readiness to smash and destroy. They are bound to fail, just as the Luddites before them--*if* the polygraph profession gets a fair shake in the media and from our elected representatives. Truth, after all, has long been proven hard to destroy.

APPENDIX 1

State Regulation and the American Polygraph Association

A. *The American Polygraph Association*

The American Polygraph Association was formed in August of 1966 by a merger of three predecessor organizations--The Academy for Scientific Interrogation, The American Academy of Polygraph Examiners, and The National Board of Polygraph Examiners.

The APA came into being because of a desire of the profession to raise standards of education, training and instrumentation, and to advance the field through licensing and regulation. In order that the reader may have a better understanding of the APA and how it relates to the profession, sections of its Constitution, Ethics and Principles of Practice are reproduced herewith:

1. Excerpts from Constitution:

Article II: Objectives of the APA

The objectives of the American Polygraph Association shall be to advance the use of the polygraph as a profession as a means of promoting social welfare by the encouragement of the use of the polygraph in its broadest and most liberal manner; by promotion of research into instrumentation and techniques; by the improvement of the qualifications of polygraph examiners through high standards of professional ethics, conduct, education and achievement; to unify polygraph examiners throughout the world and rekindle their interest in the use of the polygraph and in the APA, by the increase and diffusion of polygraph technology through meetings, professional contacts, reports, papers, discussions and publications; thereby to advance scientific, professional and public acceptance of the contributions of polygraph techniques to the promotion of the public welfare and to keep the APA informed of member sentiment and urge the membership's active participation in civic and community affairs where the polygraph is concerned; and to publicize the name and prestige of the APA.

Article III: Membership and Voting Rights

There are five classes of membership: Member, Intern, Affiliate, Honorary, and Life.

Member:
To qualify for full privileges and standing as a member, the applicant must meet the following requirements.

a. The applicant must have completed a course of formal instruction in polygraph instrumentation and techniques totaling at least 200 hours of classroom instruction at a school (civilian, military or governmental) that is fully recognized and accredited by the APA.

b. The applicant must have administered at least 200 polygraph examinations within a three-year period following completion of formal instruction.

c. The applicant must have demonstrated proficiency in the conduct of polygraph examinations to the satisfaction of the Membership Committee.

d. The applicant must possess, as a minimum, a degree at the baccalaureate level from a college or university accredited by the Regional Accreditation Board.

e. The applicant shall have satisfied his financial obligations to the APA, due and payable on or after January first, but no later than the date of the annual seminar of the APA.

Intern:

Applicants for Intern membership shall be admitted upon the approval of the Membership Committee during the period of their formal training or internship as polygraph examiners, provided:

a. The applicant meets the educational level requirement as cited in Article III, A-1-d.

b. The Intern membership shall not be extended beyond three years from the date of acceptance to Intern membership, except where extenuating circumstances are approved by the Membership Committee.

c. The Intern applicant has satisfied his annual financial obligations to the APA before the date of the annual APA seminar.

d. Intern members in good standing shall be eligible to attend and participate in all activities of the APA open to the membership, but shall not represent themselves as being anything but Intern members of the APA.

e. Intern members shall have no voting rights in matters before the APA, nor are Intern members eligible for election to office in the APA.

Affiliate:

Persons who possess a sincere interest in the polygraph field shall be eligible for membership as Affiliate members of the APA. Applicants for Affiliate membership may include representatives of polygraph instrument manufacturers, personnel involved in the research of polygraph instrumentation and techniques, and any other persons who are approved by the Membership Committee as having a valid or professional interest in the polygraph field.

a. Affiliate members in good standing must satisfy their financial obligations to the APA before the date of the annual APA seminar.

b. Affiliate members in good standing shall be eligible to attend and participate in all activities of the APA open to the membership, but shall

not represent themselves as being other than Affiliate members of the APA.

c. Affiliate members shall have no voting rights in matters before the APA, nor are Affiliate members eligible for election to office in the APA.

Article VIII: Standing Committees

The following standing committees shall be appointed annually by the newly elected president.

Membership and Grievance Committee:

A Membership Committee, consisting of at least three members, two of whom do not hold elected office in the APA, shall be appointed annually. The Membership Committee shall be empowered to examine the qualifications of applicants for all types of membership in the APA. It shall perform such investigations as may be required in their discretion to determine the eligibility for membership of such applicants. Names of applicants for membership shall be circulated among the membership of the APA at least thirty days prior to nominating the applicants to the Board of Directors in order to permit the expression of approval or disapproval by the members. The Membership Committee shall present its nominations for admission of qualified applicants to the Board of Directors. The Membership Committee shall also consider charges against members and make their appropriate recommendations to the Board of Directors.

Committee on Standards and Ethics:

The president shall appoint annually a Committee on Standards and Ethics, including at least three members who do not hold elected office in the APA. This Committee shall undertake the accreditation of training facilities, polygraph schools and shall examine suggestions for improvement or standardization of polygraph techniques. In addition, this Committee shall devise a code of ethics of the merging organizations, as well as those embodied in licensing laws of the various state legislatures.

2. Code of Ethics

The members of the AMERICAN POLYGRAPH ASSOCIATION hold themselves bound, individually and collectively, to the following Code of Ethics:

I. To maintain the highest standards or moral, ethical and professional conduct; to be governed by laws of equity and justice in the performance of all functions.

II. To respect the inherent dignity of all mankind; to deal justly, fairly, and impartially with each individual, irrespective of social, political, racial, ethnic or religious considerations, economic status, or physical characteristics.

III. To discharge professional duties and obligations with independence,

dignity, and self-respect; to keep all decisions and reports scrupulously free from any personal, financial, political, fraternal, social or other extraneous influence.

IV. To refrain from false or misleading advertising; to accept no remuneration for services rendered unless such be fair and reasonable; to decline to represent knowingly both sides of an area at issue, except by express permission of those concerned, given after a full disclosure of the facts; to represent with undivided fidelity.

V. To refrain from express or implied public criticism of any member of the AMERICAN POLYGRAPH ASSOCIATION, except as may be required by due process of law, placing the welfare and advancement of the Association and the polygraph profession above personal desires and ambitions.

VI. To recommend for membership in the AMERICAN POLYGRAPH ASSOCIATION only those persons who are believed to be fully qualified for the class of membership for which they are applying; who subscribe completely to the moral and ethical standards and Principles of Practice of the Association; and who will strive in every way to be a credit to the polygraph profession.

VII. To support to the best of their ability the professional goals of the AMERICAN POLYGRAPH ASSOCIATION: to support scientific reaseach in the polygraph field; to contribute to better community relations; through word and deed to elevate the status of the polygraph profession.

3. Standards and Principles of Practice

In order to achieve unity of purpose, to assure a clear concept of obligations to each other and the profession, and to provide for the continuing welfare and protection of the general public, all members of the AMERICAN POLYGRAPH ASSOCIATION have agreed to abide by the following Standards and Principles of Practice.

1. A member shall recognize the fact that his primary responsibility must be to the person who has volunteered for a polygraph examination, regardless of the circumstances which created the need for the examination.

2. Recognizing that a polygraph examination cannot be conducted on a person against his will, no member will attempt to conduct an examination when he has reason to believe the examinee has been subjected to coercion or duress. Further, no member shall conduct any examination on a person without first advising the examinee of the rights enjoyed by every American citizen against self-incrimination and invasion of privacy.

3. No member shall conduct an examination on any person unless he uses an instrument which makes a permanent simultaneous recording on a moving chart of at least two physiological tracings: the pneumograph and the cardio-sphymograph. This shall not preclude the recording of additonal physiological phenomena on the same charts. The provisions of this paragraph shall be subject to such modification as may be required to comply with any state or federal licensing regulation.

4. No member shall conduct an examination on any person whom he believes to be physically or psychologically unfit for testing. In case of doubt as to the propriety of administering a test in any given situation, the member shall seek expert guidance from a competent medical or psychological authority prior to testing.

5. No member shall render a conclusive verbal or written decision or report based on chart analysis without having administered two or more polygraph tests.

6. No member shall terminate a polygraph examination without affording the examinee a reasonable opportunity to explain and to eliminate any reactions which are evident on the charts. Further, no member shall accept the explanation of the examinee for a chart response without verification.

7. No member shall, unless professionally qualified to do so, include in any written report any statement purporting to be a medical, legal, or psychiatric opinion or which would infringe upon areas under the cognizance of professionals in those fields. This shall not preclude the examiner from describing the appearance or behavior of the examinee, if this is pertinent to the examination, as long as the examiner refrains from offering any diagnosis which he is professionally unqualified to make.

8. A member shall not conduct an examination where he has reason to believe the examination is intended to circumvent or to defy the law.

9. A member shall not conduct an examination where he has reason to believe the examination is intended to interfere with or to prevent the lawful organizational activities of a labor union.

10. A member shall not solicit or accept irregular fees, gratuities, or gifts which may be intended to influence his opinion or decision. Further, no member shall set a fee for professional polygraph services contingent upon the findings or results of such services; nor shall he increase any initial fee as a direct result of his findings during any polygraph examination.

11. A member shall not knowingly issue or permit his employees to issue a polygraph examination report which is misleading, biased, or falsified in any way. Each polygraph report shall be a factual, impartial and objective account of the pertinent information developed during the examination and the examiner's professional conclusion, based on analysis of the polygraph charts.

12. A member shall be guilty of gross negligence if it be proved that he did not in fact obtain data reported as factual in any polygraph report. Further, it shall be deemed highly unethical for any examiner to express verbally or in writing a test conclusion which is based solely upon subjective opinion or personal assumption. This does not preclude a professional judgment based on analysis of the polygraph charts, in the absence of substantive admissions by the examinee.

13. A member shall not publish nor cause to be published any false or misleading advertisements relating to the polygraph profession.

14. A member shall not offer testimony concerning the charts or conclusions presented by another member unless he is thoroughly familiar with the techniques and procedures used by the other member. This paragraph shall not prohibit a member from testifying concerning his independent examination of the same examinee.

15. Any person who is convicted of a felony or a crime involving moral turpitude shall be ineligible for any class of membership in the AMERICAN POLYGRAPH ASSOCIATION.

16. A member shall abide by decisions and recommendations officially adopted by the AMERICAN POLYGRAPH ASSOCIATION at any regularly scheduled meeting.

B. *State Licensing*

The American Polygraph Association is completely in favor of state licensing and regulation of the profession. Through its own efforts and those of various state associations, the APA has supported licensing attempts in most of the fifty states. To date, licensing bills or other regulatory laws have been passed in the following states:

Alabama	Nevada
Arkansas	New Mexico
Florida	North Carolina
Georgia	North Dakota
Illinois	Oklahoma
Kentucky	Texas
Mississippi	Virginia

As an example of the type of strong and regulatory measure which is favored by the APA, a model licensing bill is presented in Appendix 2.

APPENDIX 2

AN ACT

regulating persons who purport to be able to detect deception or to verify truth of statements through the use of instrumentation as lie detectors, polygraphs, deceptographs, and/or similar or related devices and instruments; creating as an administrative board, the Polygraph Examiners Board with licensing and/or regulatory powers over all such persons and instruments; providing for administrative proceedings and court review; establishing minimum instrumentation requirements and prohibiting the use of instruments or devices which do not meet minimum instrumentation requirements; providing for injunctions and penalties for violation of the provisions of this Act; providing a savings clause; and declaring an emergency.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF _____

Short title

Section 1. This Act shall be known, and may be cited, as the Polygraph Examiners Act.

Purpose

Section 2. It is the purpose of this Act to regulate all persons who purport to be able to detect deception or to verify truth of statements through the use of instrumentation (as lie detectors, polygraphs, deceptographs, and/or similar or related devices and instruments without regard to the nomenclature applied thereto) and this Act shall be liberally construed to regulate all such persons and instruments. No person who purports to be able to detect deception or to verify truth of statements through instrumentation shall be held exempt from the provisions of this Act because of the terminology which he may use to refer to himself, to his instrument, or to his services.

Definitions

Section 3. In this Act, unless the context requires a different definition,

(1) "board" means the Polygraph Examiners Board;

(2) "secretary" means that member of the Polygraph Examiners Board selected by the board to act as secretary;

(3) "internship" means the study of polygraph examinations and of the administration of polygraph examinations by a trainee under the personal supervision and control of a polygraph examiner in accordance with a course of study prescribed by the board at the commencement of such internship;

(4) "person" means any natural person, firm, association, copartnership, or corporation; and

(5) "polygraph examiner" means any person who purports to be able to detect deception or verify truth of statements through instrumentation or the use of a mechanical device.

Minimum instrumentation required

Section 4. Any instrument used to test or question individuals for the purpose of detecting deception or verifying truth of statements shall record visually, permanently, and simultaneously: (1) a subject's cardiovascular pattern and (2) a subject's respiratory pattern. Patterns of other physiological changes in addition to (1) and (2) may also be recorded. The use of any instrument or device to detect deception or to verify truth of statements which does not meet these minimum instrumentation requirements is hereby prohibited and the operation or use of such equipment shall be subject to penalties and may be enjoined in the manner hereinafter provided.

Creation of the board

Section 5. (a) There is hereby established a Polygraph Examiners Board consisting of six members who shall be citizens of the United States and residents of the state for at least two years prior to appointment, all of whom shall have been engaged for a period of five consecutive years as a polygraph examiner prior to appointment to the board, and at the time of appointment as as active polygraph examiner. No two board members may be employed by the same person or agency. At least two members must be qualified examiners of a governmental law enforcement agency and at least two members must be qualified polygraph examiners in the commercial field. The members shall be appointed by the Governor of the State of _____ with the advice and consent of the Senate for a term of six years. The terms of office of members appointed to the initial board are two for two years; two for four years; and two for six years. Any vacancy in an unexpired term shall be filled by appointment of the Governor with the advice and consent of the Senate for the unexpired term.

(b) The number of employees and the salaries of each, including travel and expense allowance of the members of the board shall be as fixed in the General Appropriation Bill.

(c) The board shall meet withing 30 days after the effective date of this Act and elect a chairman, vice-chairman, and a secretary from among its members. At the meeting, the board shall specify dates spaced at three month intervals on which examinations for polygraph examiners' licenses will be held. A copy of those dates shall forthwith be delivered to the secretary.

(d) The vote of a majority of the board members is sufficient for passage of any business or proposal which comes before the board.

Administration and expenses

Section 6. (a) The board shall issue regulations consistent with the provisions of this Act for the administration and enforcement of this Act and shall prescribe forms which shall be issued in connection therewith.

(b) An order or a certified copy thereof, over the board seal and purporting to be signed by the board members, shall be prima facie proof that the signatures are genuine signatures of the board members, and that the board members are fully qualified to act.

(c) All fees collected under the provisions of this Act shall be paid to the Treasurer of the State of _____. Funds necessary for the enforcement of this Act and the administration of its provisions shall be appropriated by the Legislature, but the funds so appropriated for a biennium shall not exceed the total amount of the fees which it is anticipated will be collected hereunder during such biennium.

OPTIONAL (d) The fees collected during the first (biennium) (fiscal year) shall go to the administration of this Act.

Unauthorized practice

Section 7. It shall be unlawful for any person, including a city, country, or state employee, to administer polygraph or other examinations utilizing instrumentation for the purpose of detecting deception or verifying truth of statement or to attempt to hold himself out as a polygraph examiner or to refer to himself by any other title which would indicate or which is intended to indicate or calculated to mislead members of the public into believing that he is qualified to apply instrumentation to detect deception or to verify truth of statements without first securing a license as herein provided.

Examiner's license qualifications

Section 8. A person is qualified to receive a license as an examiner

(a) who is at least 21 years of age; and

(b) who is a citizen of the United States; and

(c) who establishes that he is a person of honesty, truthfulness, integrity, and moral fitness; and

(d) who has not been convicted of a felony or a misdemeanor involving moral turpitude; and

(e) who holds a baccalaureate degree from a college or university accredited by the American Association of Collegiate Registrars and Admissions Officers;

OPTIONAL who holds a baccalaureate degree from a college or university accredited by the American Association of Collegiate Registrars and Admissions Officers, or in lieu thereof, is a graduate of an accredited high school and has five consecutive years of active investigative experience immediately preceding his application; and

(f) who is a graduate of a polygraph examiners course approved by the board and has satisfactorily completed not less than six months of internship training; and

OPTIONAL who is a graduate of a polygraph examiners course approved by the board and has satisfactorily completed not less than six months of internship training, provided that if the applicant is not a graduate of an approved polygraph examiners course, satisfactory completion of not less than 12 months of internship training may satisfy this subdivision; and

(g) who has passed an examination conducted by the board, or under its supervision, to determine his competency to obtain a license to practice as an examiner.

OPTIONAL (h) Prior to the issuance of a license, the applicant must furnish to the board evidence of a surety bond or insurance policy. Said surety bond or insurance policy shall be in the sum of $5,000.00 and shall be conditioned that the obligor therein will pay to the extent of the face amount of such surety bond or insurance policy all judgments which may be recovered against the licensee by reason or any wrongful or illegal acts committed by him in the course of his examinations. (Note: Annual rate for this type of bond is $10.00 per $1,000.000)

Acquisition of license by present examiners

Section 9. On the effective date of this Act, any person who is actually engaged in the occupation, business, or profession of a polygraph examiner and who is using for that purpose the instrumentation prescribed in Section 3, shall, upon application within 90 days after the effective date of this Act and payment of the required license fee, be issued a polygraph examiner's license which shall be effective no longer than one year from date of issuance, provided, however, that the board may require such applicant to submit satisfactory proof that he is so engaged. The applicant must also satisfy such requirements of Section 8 (a)-(d) and Section 8 (g) of this Act.

OPTIONAL If Section 8 (f) is adopted, the last sentence of Section 9 shall read: "The applicant must also satisfy such requirements of Section 8 (a)-(d) and Section 8 (g)-(h) of this Act."

Applications for original license

Section 10. Applications for original licenses shall be made to the secretary of the board in writing under oath on forms prescribed by the board and shal be accompanied by the required fee, which is not refundable. Any such applicatio shall require such information as in the judgment of the board will enable it to to pass on the qualifications of the applicant for a license.

Non-resident applicants

Section 11. (a) Each non-resident applicant for an original license or a renewal license shall file with the board an irrevocable consent that actions against said applicant may be filed in any appropriate court of any county or municipality of this state in which the plaintiff resides or in which some part of the transaction occurred out of which the alleged cause of action arose and that process on any such action may be served on the applicant by leaving two copies thereof with the secretary. Such consent shall stipulate and agree that such service or process shall be taken and held to be valid and binding for all purposes. The secretary of the board shall send forthwith one copy of the process to the applicant at the address shown on the records of the board by registered or certified mail.

(b) Non-resident applicants must satisfy the requirements of Section 8 of this Act.

Applicant with out-of-state license

Section 12. An applicant who is a polygraph examiner licensed under the law of another state or territory of the United States may be issued a license withou

examination by the board, in its discretion, upon payment of a fee of $_____ and the production of satisfactory proof that

(a) he is at least 21 years of age; and

(b) he is a citizen of the United States; and

(c) he is of good moral character; and

(d) the requirements for the licensing of polygraph examiner in such particular state or territory of the United States were at the date of the applicant's licensing therein substantially equivalent to the requirements now in force in this state; and

(e) the applicant had lawfully engaged in the administration of polygraph examinations under the laws of such state or territory for at least two years prior to his application for license hereunder; and

(f) such other state or territory grants similar reciprocity to license holders of this state; and

(g) he has complied with Section 11 of this Act.

Internship license

Section 13. (a) Upon approval by the board, the secretary shall issue an internship license to a trainee provided he applies for such license and pays the required fee within 10 days prior to the commencement of his internship. The application shall contain such information as may be required by the board.

(b) An internship license shall be valid for the term of 12 months from the date of issue. Such license may be extended or renewed for any term not to exceed 6 months upon good cause shown to the board.

(c) A trainee shall not be entitled to hold an internship license after the expiration of the original 12 month period and 6 month extension, if such extension is granted by the board, until 12 months after the date of expiration of the last internship license held by said trainee.

Examination and license fees

Section 14. (a) The fee to be paid by an applicant for an examination to determine his fitness to receive a polygraph examiner's license is $_____, which is not to be credited as payment against the license fee.

(b) The fee to be paid for an original polygraph examiner's license is $_____.

(c) The fee to be paid for the issuance of a duplicate polygraph examiner's license is $_____.

(d) The fee to be paid for an internship license is $_____.

(e) The fee to be paid for a polygraph examiner's renewal license is $_____.

(f) The fee to be paid for the extension or renewal of an internship license is $_____.

(g) The fee to be paid for a duplicate internship license is $_____.

(h) The fees required by this Act may be paid by the governmental agency employing the examiner.

Display of license and signature thereon

Section 15. A license or duplicate license must be prominently displayed at the place of business of the polygraph examiner or at the place of internship. Each license shall be signed by the board members and shall be issued under the seal of the board.

Change of business address

Section 16. Notice in writing shall be given to the secretary by the licensed examiner of any change of principal business location within 30 days of the time he changes the location. A change of business location without notification to the secretary shall automatically suspend the license theretofore issued.

Termination and renewal of examiner's license

Section 17. Each polygraph examiner's license shall be issued for the term of one year and shall, unless suspended or revoked, be renewed annually as prescribed the the board. A polygraph examiner whose license has expired may at any time within two years after the expiration thereof obtain a renewal license without examination by making a renewal application therefore and satisfying Section 8 (b), (c), and (d). However, any polygraph examiner whose license expired while he was in the federal service on active duty with the armed forces of the United States, or the national guard called into service or training, or in training or education under the supervision of the United States preliminary to induction into the military service, may have his license renewed without examination if within two years after termination of such service, training, or education except under condition other than honorable, he furnishes the board with an affadavit to the effect that he has been so engaged and that his service, training, or education has been so terminated. Section 8 (b), (c), and (d) of this Act must also be satisfied.

License required to maintain suit

Section 18. No action or counter claim shall be maintained by any person in any court in this state with respect to any agreement or service for which a license is required by this Act, or to recover the agreed price or any compensation under such agreement, or for such services for which a license is required by this Act without alleging and proving that such person had a valid license at the time of making such agreement or perform such services.

Refusal, suspension, revocation--grounds

Section 19. The board may refuse to issue or may suspend or revoke a license on any one or more of the following grounds:

(a) for failing to inform a subject to be examined as to the nature of the examination;

(b) for failing to inform a subject to be examined that his participation in the examination is voluntary;

(c) material misstatement in the application for original license or in the application for any renewal license under this Act;

(d) willful disregard or violation of this Act or of any regulation or rule issued pursuant thereto, including, but not limited to, willfully making a false report concerning an examination for polygraph examination purposes;

(e) if the holder of any license has been adjudged guilty by the commission of a felony or misdemeanor involving moral turpitude;

(f) making any willful misrepresentation or false promises or causing to be printed any false or misleading advertisement for the purpose of directly or indirectly obtaining business or trainees;

(g) having demonstrated unworthiness or incompetency to act as a polygraph examiner as defined by this Act;

(h) allowing one's license under this Act to be used by any unlicensed person in violation of the provisions of this Act;

(i) Willfully aiding or abetting another in the violation of this Act or any regulation or rule issued thereto;

(j) where the license holder has been adjudged an habitual drunkard or mentally incompetent as provided in the Probate Code;

(k) failing, within a reasonable time, to provide information requested by the secretary as the result of a formal complaint to the board which would indicate a violation of this Act; or

(l) failing to inform the subject of the results of the examination if so requested.

Violation by one examiner or trainee not to affect employer

Section 20. Any unlawful act or violation of any of the provisions of this Act on the part of any polygraph examiner or trainee shall not be cause for revocation of the license of any other polygraph examiner for whom the offending examiner or trainee may have been employed, unless it shall appear to the satisfaction of the board that the polygraph examiner-employer has willfully or negligently aided or abetted the illegal actions or activities of the offending polygraph examiner or trainee.

Registration of examiners with county clerks

Section 21. Each polygraph examiner shall register with the county clerk in the county wherein he maintains a business address. The county clerk of each county shall maintain a list of all polygraph examiners registered in his county.

Board hearing

Section 22. (a) When there is cause to refuse an application or to suspend or revoke the license of any polygraph examiner, the board shall, not less than 30 days before refusal, suspension, or revocation action is taken, notify such person in writing, in person or by certified mail at the last address supplied to the board by such person, of such impending refusal, suspension, or revocation, the reasons therefor, and of his right to an administrative hearing for the purpose of determining whether or not the evidence is sufficient to warrant the refusal, suspension, or revocation action proposed to be taken by the board. If, within 20 days after the personal service of such notice or such notice has been deposited in the United States mail, such person has not made a written request to the board for this administrative hearing, the board is authorized to suspend or revoke the polygraph examiner's license of such person without a hearing. Upon receipt by the board of such written request of such person within the 20 day period as set out above, an opportunity for an administrative hearing shall be afforded as early as is practicable. In no case shall the hearing be held less than 10 days after written notification thereof, including a copy of the charges, shall have been given the person by personal service or by certified mail sent to the last address supplied to the board by the applicant or licensee. The administrative hearing in such cases shall be before the board.

(b) The board shall conduct the adminstrative hearings and it is authorized to administer oaths and issue subpoenas for the attendance of witnesses and the production of relevant books, papers, documents, etc. On the basis of the evidence submitted at the hearing, the board shall take whatever action it deems necessary in refusing the application or suspending or revoking the license.

Judicial review

Section 23. Any person dissatisfied with the action of the board in refusing his application or suspending or revoking his license, or any other action of the board, may appeal the action of the board by filing a petition within 30 days thereafter in the district court in the county where the person resides or in the district court of (County) _____, (State) _____, and the court is vested with jurisdiction and it shall be the duty of the court to set the matter for hearing upon 10 days' written notice to the board and the attorney representing the board. The court in which the petition of appeal is filed shall determine whether or not a cancellation or suspension of a license shall be abated until the hearing shall have been consummated with final judgment thereon or whether any other action of the board should be suspended pending hearing, and enter its order accordingly, which shall be operative when served upon the board, and the court shall provide the attorney representing the board with a copy of the petition and order. The board shall be represented in such appeals by the district or county attorney of the county or the Attorney General, or any of their assistants. The board shall initially determine all fact, but the court upon appeal shall set aside the determination of the board if the board's determination (1) is not based upon substantial evidence upon the entire record; (2) is arbitrary or capricious; (3) is in violation of statutory requirements; or (4) was made without affording to licensee or applicant due process of law.

Surrender of license

Section 24. Upon the revocation or suspension of any license, the licensee shall forthwith surrender the license or licenses to the secretary; failure of a licensee to do so shall be violation of this Act and upon conviction, shall be subject to the penalties hereinafter set forth. At any time after the suspension or revocation of any license, the secretary shall restore it to the former licensee, upon the written recommendation of the board.

Proceedings through the attorney general

Section 25. If any person violates any provisions of this Act, the secretary shall, upon direction of a majority of the board, in the name of the State of _____, through the Attorney General of the State of _____, apply in any district court of competent jurisdiction, for an order enjoining such violation or for an order enforcing compliance with this Act. Upon the filing of a verified petition in the court, the court or any judge thereof, if satisfied by affidavit or otherwise that the person has violated this Act, may issue a temporary injunction, without notice or bond, enjoining such continued violation and if it is established that the person has violated or is violating this Act, the court, or any judge thereof, may enter a decree perpetually enjoining the violation or enforcing compliance with this Act. In case of violation of any order or decree issued under the provisions of this Section, the court, or any judge

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thereof, may try and punish the offender for contempt of court. Proceeding under this Section shall be in addition to, and not in lieu of, all other remedies and penalties provided by this Act.

Penalties

Section 26. Any person who violates any provision of this Act or any person who falsely states or represents that he has been or is a polygraph examiner or trainee or that is qualified to apply instrumentation to the detection of deception or verification of truth of statements shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not less than $100 nor more than $1,000 or by imprisonment in the county jail for a term of not to exceed six months, or both.

Savings clause

Section 27. The provisions of this Act are severable. If any provision of this Act or the application thereof to any person or circumstance shall be held to be invalid or unconstitutional, the remainder of the Act and the application of such provisions to other persons or circumstances shall not be affected thereby.

Emergency clause

PTIONAL Section 28. The fact that this state has no law licensing and regulating the use of lie detection or polygraph examination techniques and instruments, and that untrained and unlicensed examiners, and examiners using inadequate techniques and equipment cause great harm to the general public, creates an emergency and an imperative public necessity that the Constitutional Rule requiring bills to be read on three separate days in each House be suspended, and this Rule is hereby suspended; and that this Act take effect and be in force from and after its passage, and it is so enacted.

APPENDIX 3

The Polygraph and the Courts

In 1923, an Appellate Court first entertained the possibility of the admissibility of evidence of a lie-detector test. This was in the case of *Frye* vs. *United States*. (1) In this case, the defendant unsuccessfully attempted to introduce into evidence the results of a "systolic blood pressure" examination. The opposition to the admission of lie-detector evidence was firmly established when the court declared:

> "Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained *general acceptance in the particular field in which it belongs*.
>
> "We think the systolic blood pressure deception test has not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the courts in admitting expert testimony deduced from the discovery, development, and experiments thus far made."

Although the legal reasoning upon which the *Frye* decision was based is unquestionably sound, it is nonetheless apparent that justice was thwarted in the process. The defendant, after serving three years of a life sentence, was exonerated by the confession of the actual killer, and released.

In the fifty years since the *Frye* decision, the polygraph has certainly become more reliable and it would appear that the requirement of "general acceptance in its particular field" has long since been satisfied. In spite of this, polygraph evidence has been unable to penetrate into the realm of admissibility. Famed Criminal Attorney F. Lee Bailey writes:

> "The courts place a higher standard on the acceptance of polygraph evidence than on any other scientific evidence, e.g., fingerprints, handwriting analysis, ballistics, etc. The courts are seeking infallibility before granting judicial recognition to polygraph evidence." (2)

In 1953, Dean William Wicker of the University of Tennessee, College of Law, wrote the following:

> "If and when convincing evidence is produced that reasonably reliable scientific methods of exposing falsehoods either in or out of the courtroom are available, these methods should be promptly utilized by the legal profession.

(1) 54 App. D.C. 46, 293F. at 1013 (1923)

(2) Criminal Law Library F. Lee Bailey, Henry B. Rothblatt, Investigation and Preparation of Criminal Cases, Federal and State, Lawyers Co-operative, Bancroft-Whitney, Rochester, N.Y. 91970) Par. 379, page 299.

> Lawyers, judges and law professors know that there is today in our courtroom entirely too much intentional perjury and that it is usually difficult, and often impossible, for even an experienced trial lawyer to expose on cross-examination many of the lies of false-swearing witnesses. The legal profession can no longer assume a complacent attitude concerning our present methods of exposing mendacity." (3)

In 1943, Dr. Lemoyne Snyder, medico-legal expert and member of the now-defunct Court of Last Resort, and author of *Homicide Investigation,* took this position:

> "The next question is apt to be, 'Is the machine infallible?' That question is exactly like asking whether a clinical thermometer, stethoscope, X-ray machine or compound microscope is infallible. A trained scientist may be mistaken in what he sees or hears by any of these devices. Like the thermometer and stethoscope the polygraph is simply an instrument for noting or recording physiological processes and it is possible for the operator to be mistaken in his interpretation of the recording. Even in the best of clinics the interpretation is not 100 percent accurate, but that does not imply that the machine should not be used. The same can be said for the polygraph." (4)

The only exception in many jurisdictions to the general rule of inadmissibility is the admissibiltiy of stipulated polygraph evidence. Both parties must sign the stipulation, which provides for the application of the test and the admission of the test results, regardless of the outcome. Such a stipulation should also specify the test conditions, the issue of general reliability, the right to cross-examine with respect to the qualifications of the examiner, and any other matters deemed relevant by the trial judge.

> . . . if the trial judge is not conviced that the examiner is qualified or that the test was conducted under proper conditions he may refuse to accept the evidence.
>
> That if such evidence is admitted the trial judge should instruct the jury that the examiner's testimony does not tend to prove or disprove any element of the crime with which a defendant is charged but at most tends only to indicate that at the time of the examination defendant was not telling the truth. (5)

A degree of stability was gained in the case of *State* vs.*Valdez* (6), in which the Supreme Court of Arizona held that expert testimony relating to the polygraph and polygraph results was admissible upon stipulation by both parties. The court further stated that this evidence would be inadmissible in the absence of the stipulation. The court acknowledged that lie-detection technique had been improving steadily but that much more should be done before the results can be admitted generally. By so stating, the court left open the question of scientific reliability of lie-detector results.

In *The People* vs. *House* (7), the validity of the stipulation with regard to the admissibility of lie-detection results was upheld. The defendant, with his

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(3) Wicker, Wm., *The Polygraphic Truth Test and the Law of Evidence,* 22 Tenn. L. Rev. 711 (1953).
(4) 15 Rocky Mtn L. Rev. 162 (1943).
(5) Id.
(6) 91 Ariz. 274, 371 P. 2d 894 (1962)
(7) 85 Cal. App. 2d 686, 193, P.2d 937 (1948)

attorney's approval, had signed an agreement under which the results would be admissible on behalf of himself or the state. He was convicted of a sex offense but appealed on the grounds that the results were inadmissible regardless of the fact that he had signed a stipulation. In affirming the conviction, the court stated:

> "It would be difficult to hold that defendant should now be permitted on this appeal to take advantage of any claim that such operator was not an expert and that as to the results of the test such evidence was inadmissible merely because it happened to indicate that he was not telling the truth. . . ." (8)

The polygraph, even with the strict rules of evidence against its use, has progressed to the point where many courts now use the results of polygraph examinations in their decisions. The most progressive group of jurists are the judges of the Municipal Courts of Chicago, who have for the most part regularly admitted and relied upon such results as evidence in criminal, quasi-criminal and civil cases for over thirty years. Preliminary hearing courts such as Felony Court and Boys' Court in Chicago regularly use polygraphy to assist the judge in determining whether the defendant should be bound over to the Grand Jury or freed.

Judge Rodger Alton Pfaff of the Supreme Court of Los Angeles County has stated: "An adequate polygraph in the hands of a competent examiner can be adequate aid in the administration of justice." (9) Since March 1962, the Los Angeles Superior Court has been employing the polygraph in domestic relations cases, first in child custody cases and later in paternity cases with excellent results to such an extent that now attorneys ask for the polygraph and not the judges in many cases. (10) In 1968, the Grand Jury of Anne Arundel County, Maryland recommended to the State's Attorney's Office that, in all offenses involving crimes against persons, the victim should be required to submit to a polygraph examination to confirm their complaint, and the state attorney has placed into practice this recommendation which has had excellent results in depicting numerous false complaints being made to the police.

The results of a lie-detector test were admitted over the objection of the prosecution in the case of Andrew Ferrando in a trial in Hennepin County District Court, Minnesota in October 1969 by Judge Dana Nicholson. Ferrando was being tried by the jury for lurking in order to commit theft in a northeast Minneapolis bar. After the trial, Judge Nicholson told reporters that he had studied the development of lie-detectors, formally called polygraphs, and believed they have reached the point where they are reliable enough to be admitted as evidence (11).

Albert S. Dabrowski, in his article "The Polygraph Revisited: An Argument for Admissibility" as published in the Criminal Law Bulletin Vol. 6, No. 2, 1970, says:

> "The present legal attitude with respect to the lie-detector reflects a position which has not been materially recast since 1923. At that time, the instrument was merely a device concerned with the recordation of blood pressure variations. It has since matured into a sophisticated procedure employ-

(8) Id. at 694-95, 193, P.2d at 942.
(9) Rodger Pfaff, "The Polygraph: An Invaluable Judicial Aid." *American Bar Association Journal,* (Chicago, 1964), Vol. 50, No. 12, p. 1130.
(10) Ibid., p. 1131.
(11) "Results of Lie-Detector Test Accepted," *(The Minneapolis Star) American Polygraph Association Newsletter,* (Hollywood, 1969), Vol. 3, No. 6, p. 3.

> ing numerous physiological measurements, which, when in the hands of a competent examiner, is commensurate with, and even superior to, most of the presently approved forms of evidence, scientific as well as non-scientific, that feature in criminal and civil trials. (12)

This scientific development has be paralleled by a corresponding growth in the polygraph's employment by government, private industry and particularly law enforcement agencies. In fact, it is only the judiciary which has not accepted the instrument.

The value of the polygraph technique, when used in a proper manner, warrants judicial recognition. This does not imply unconditional acceptance. The endorsement is limited strictly to the area where the examination has exhibited a high degree of reliability in the hands of a *competent* examiner under the proper test conditions.

The examiner, in all cases, must be available for cross-examination and court inquiry into the test environment, the reliability issue,and his own personal qualifications. In criminal cases, the defendant must be advised of the right to counsel and the right to remain silent.

Attorney F. Lee Bailey, has laid a foundation in support of scientific proof of credibility in not less than six trials, but in each case where such testimony was produced by experts, an acquittal resulted and no appellate test could be made of the admissibility of the polygraph. Bailey has stated that the prosecution in almost all cases involved was unable to marshal even a recognizable rebuttal. Bailey has been quoted as follows:

> "He believes that evidence of polygraph tests could be of immense help to courts in protecting the innocent, and in corroborating complaints for the just conviction of the guilty. He is of the opinion, based on his experience as a criminal investigator, attorney and polygraph expert (but not examiner), that the use of such evidence could effectively streamline our system of criminal justice and eliminate the need for many trials without in any way impairing the fairness or efficiency of the jury process.
>
> "In these troubled times when courts are backlogged with controversies of every kind and lawyers and judges are forced to rely on a system where mendacity among the litigants is more often the rule than the exception, the polygraph technique could precipitate dramatic and bountiful improvement in our law. The concerned speculation that juries will give way to polygraphs as a system of justice, if perhaps plausible is by no means sound. Much more likely is the fact that those litigants and witnesses who are not inhibited by an oath will, knowing that means of checking their proposed testimony is available, make much less frequent appearances on the witness stand. If guilty defendants are persuaded to plead guilty because of the presence of the polygraph in our column of scientific evidence, good will certainly be the product of this development. Certainly, other scientific progress in the past has reduced the opportunity of the guilty to escape justice and enhanced the likelihood that the innocent will

(12) Preface to Reid at v.

not be tried at all. Fingerprints, firearms identification, chemical tests for intoxication, blood tests for paternity, and even mechanical devices for measuring a motorist's speed have all contributed to the accuracy and reliability of the judgment of a court. The time has clearly come for the adoption in our system of this invaluable aid to judicial accuracy" (13).

During 1972, a dramatic change was apparent in the attitude of the courts with respect to admissibility of polygraph. Some of the highlights follow.

a) In August 1972, Judge Warren Douglas of the Cherry Hill (New Jersey) Municipal Court upheld the right of an employer to use a polygraph test as an alternative to a credit check in interviewing prospective employees. The New Jersey law stipulates that the employer may not require a lie detector test as a condition of employment or continued employment. Judge Douglas ruled that the polygraph was used only as an alternative to a credit check and that the written statement signed by job applicants suffiently informed them that the lie detector test was not a condition of employment.

b) In October 1972, the results of a lie detector test were admitted into evidence in a New York State court for what the judge said was the first time in New York history. Acting Judge Julian R. Hanley of the Family Court said that he had ordered the test for a woman plaintiff in a paternity case.

He later admitted the results as evidence and subsequently denied her petition to have the defendant named as the father of her child. In making his decision, Judge Hanley noted that lie detector tests have been used by prosecutors and lawyers for years. "Everyone but the court has found it a useful and reliable guide to the truth," Hanley said. "The courts and all concerned were fully aware of the fact that lie detector tests have never been allowed into evidence before in the courts of this state." In his decision of this case Judge Hanley said that the lie detector test was received in evidence "Not as direct proof of fact," but rather "only on the question of the credibility of the petitioner."

c) Judge James Calhoun of the Juvenile Court in Tampa, Florida now requests parents to take polygraph examinations in cases where questions arise concerning the care of small children, according to a June article in the *Tampa Tribune*.

d) In late 1972, Judge Edwin Kassoff, a judge of the Queens (New York) Civil Court, used polygraph evidence to help him decide if a man was owed $910. The judge stated that the case was such that "even the wisdom of a King Solomon would be tried in deciding." Judge Kassoff permitted the introduction of polygraph evidence to help resolve the difficult suit involving a personal loan. The judge was believed to be the first state court judge to permit the introduction of the results of a lie detector test since 1969 when the Court of Appeals prohibited such evidence.

e) In late 1972, the New Jersey Supreme Court ruled that results of lie detector tests may be used as evidence in criminal trials, when the defense and the prosecution agree to it. In a 5-0 decision the court said that lie detector tests have become reliable enough to use as evidence.

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(13) Criminal Law Library, F. Lee Bailey, Henry B. Rothblatt, Investigation and Preparation of Criminal Cases, Federal and State, Lawyers Co-operative, Bancroft-Whitney, Rochester, N.Y. 1970, page 310 and 311, paragraph 380.

Superior Court Judge Mark A. Sullivan, who wrote the decision, wrote "we conclude that the polygraph testing has been developed into such a point of reliability that in a criminal case when the state and defendant enter into a stipulation to have the defendant to submit to a polygraph test, and have the results introduced as evidence, such a stipulation should be given effect. Polygraph testing has sufficient probative value to warrant admissions under these circumstances. It must also appear that the examiner is qualified and the test administered in accordance with established polygraph techniques."

f) U.S. District Judge Charles W. Joiner of the Eastern District of Michigan, in the case of *U.S.* vs. *Richard Ridling*, (12 CrL 2055) ruled that the results of a lie detector test can be admitted as evidence. The decision is believed to represent the first admission of polygraph evidence by any federal court in the country.

g) Shortly thereafter, the U.S. District Court Judge Barrington D. Parker of the District of Columbia, in the case of *U.S.* vs. *Zeiger* (12 CrL 2057), ruled that the results of the lie detector would be admitted as evidence in court for the first time in the District of Columbia. In making his ruling, the federal judge stated that polygraph has become "an established field of science and technology."

h) In November 1972, a California judge, Superior Court Judge Allen Miller, accepted a lie detector test as evidence, saying that scientific tests have shown the instruments to be so accurate that old rule barring the use of lie detector tests in court rooms should be changed. Judge Miller made his ruling in the case of Raymond Cutter who was arrested at Los Angeles International Airport and who took a lie detector test to prove that the evidence involved was illegally seized. The test showed that Cutter was truthful and the judge then ruled that the evidence could not be introduced.

In making his ruling, the judge said that the courts are greatly in need of some way to determine when the witnesses and defendants are telling the truth. "Perjury is prevalent and the oath taken by witnesses has little effect to deter false testimony. The principal role of the trial of fact is the search for truth and any reasonable procedure or method to assist the court in this search should be employed." He further stated that court decisions against admissibility of polygraph evidence "should be reviewed and re-evaluated in light of the current scientific knowledge of the subject."

i) In early 1973, a Dade County (Florida) Circuit Court Judge ruled a lie detector test admissible as evidence when the defendant passed a polygraph examination. The man had previously been judged guilty. The judge then set aside the guilty verdict and ordered a new trial.

For the benefit of those who wish to research the legal area of the polygraph further, a special bibliography is present herewith.

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APPENDIX 4

880 NEWS AND VIEWS

RETAIL STORE EMPLOYEES UNION LOCAL 880
2828 EUCLID AVENUE • CLEVELAND 15, OHIO

VOLUME X, NUMBER 7 JULY-AUGUST, 1968

Let's Quit the Stupid Snooping that Passes for "Store Security"

By David McDonald, President of Local 880

It's about time someone blew the whistle on the little tin-horn gestapo that passes itself off as "security forces" in some of our distinguished retail establishments.

Personally, I got about as much of it as my weak stomach could take when a blameless—and incidentally, underpaid—employee came to us recently and announced that he had been forced to quit his job for "stealing."

Had he stolen? He said no, he had not, but the "security" quizzed him, browbeat him, finally got him to "confess." Then the bold investigators dictated the "confession"—and the poor guy signed it after being promised he would not be molested, his reputation would not be stained, and he could quit in secret.

What he was not told is interesting. If he had let it go at that, the record would be left with his employer. And then, every time he sought a job, and the prospective new boss checked on his previous place of work, he would be turned down.

For the rest of his days, he would never have known what hit him. Each successive company to which he applied would note him as a thief. And yet he would never doubt that the "security" had kept its promise not to give him away.

The payoff is most remarkable. This man was innocent! Even as he protested his innocence, he was tricked into making a confession of something he knew he had not done. To his amazement, he even learned that his fellow employes had "seen" him do the evil deeds. By the time the grilling ended, he was eager enough to sign something and get out of the room, out of the store, out of the company, out of the job.

He was even convinced that by signing, he had avoided a 30-year jail sentence and permanent dishonor for his family. Even though he was innocent, he had been convinced that the "evidence" was sufficient to hang him.

This is not an isolated incident. Sometimes, as in this case, the offended worker will come to his union. Sometimes, as in this case, the union will help prove that the "confession" is phony. Sometimes, as in this case, the employee's job is won back, his slate wiped clean, his boss lavish in apology. The boss, by the way, can get away with that, too. There is no false arrest, because the man was not actually arrested.

This is another way in which the two-bit gumshoe can score his lousy points. He goes to the real law enforcement authorities and to the real courts on only rare occasions. His job ends after browbeating some poor chump into finking on himself—for nothing, if necessary.

In some cases, this closes matters—and in many cases, if a real crime has been committed, the self-styled private eye has let the real culprit go free.

Perhaps this column should have been written a long time ago. Perhaps all of us were a little reluctant to speak our minds because it is never popular to be—or even seem to be—on the side of lawlessness against the forces of law and order.

Well, we have nothing to apologize for on that point. We do not condone thievery. We have no affection for crooks, and we are as interested as the employer is in exposing and ousting them.

I strongly recommend that any employer who suspects a worker of dishonesty get in touch immediately with Local 880. If there is any cause for pursuing an investigation, we will cooperate to the fullest. If disciplinary action is needed, we will not stand in the way of any fair and, if necessary, firm action. If we find reason for calling the police or the prosecutor's office, we'll support that, too.

To our members, however, we must give these words of warning:

1. If the "Securities" call you in, do not cooperate with them. Call the union to learn of your rights.
2. Do not sign anything.
3. Under no circumstances should you submit to "lie detector" tests. These can be—and often are—rigged.

As for the employers, we can only say they had better start leashing their clumsy bloodhounds.

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The Board of Directors of the APA adopted the following resolution at the meeting of the Board on August 19, 1973, in Miami, Florida:

1. WHEREAS, Paragraph 3 of The APA Standards and Principals of practice requires at a minimum the use of an instrument, which makes a permanent simultaneous recording of the pneumograph and cariosphygmograph tracings, and permits the recording of additional physiological tracings as long as these minimum standards are met, and

2. WHEREAS, Article III, Section A. 1 of The APA Constitution establishes 200 hours of classroom instruction, followed by the completion of at least 200 polygraph examinations during the following three years as minimal requirements for APA membership, and

3. WHEREAS, The APA and its predecessors have long supported state licensing legislation to assure that persons offering truth verification services to the public meet at least minimal standards for training and instrumentation, and

4. WHEREAS, The APA has always stressed strongly that a polygraph examination can be conducted only with the consent and cooperation of the person being examined, and

5. WHEREAS, Dektor Counterintelligence, Inc., which manufactures and sells the Dektor Psychological Stress Evaluator, (PSE-1), claims that it is an instrument capable of recording a pattern, which will permit the operator to perceive psychological stress in the recorded voice patterns of the examinee, and

6. WHEREAS, The Dektor PSE-1 does not record the pneumograph and cardiosphygmograph patterns held to be minimal by the APA and by several of the states, which license polygraph examiners, and

7. WHEREAS, although The Dektor PSE-1 may be used as an additional data channel in conjunction with acceptable polygraph instrumentation, we find no record that Dektor Counterintelligence, Inc., requires this as a condition for sale. Indeed, published reports indicate that the company markets the instrument as a substitute for polygraph instruments, and

8. WHEREAS, published reports describe training periods conducted by Dektor Counterintelligence ranging from three days to one week, for persons using The Dektor PSE-1, periods which The APA can only consider to be totally inadequate, and

9. WHEREAS, The APA is deeply disturbed by published reports that the PSE-1 is capable of utilization, without the knowledge and consent of the person being examined, by means of surreptitious recordings, telephone transmissions, and video or radio signals, since such utilization would contravene constitutional guarantees in regard to self-incrimination and the unlawful invasion of privacy, and

10. WHEREAS, The APA stands ready to reexamine its position in regard to the PSE-1 upon receipt of evidence of validity and reliability for the instrument and techniques for its use, and reasonable standards for the selection and training for persons using this equipment, as well as adequate means to assure protection of the Constitutional rights of persons being examined, then

Be it hereby resolved that The American Polygraph Association disapproves the use of The Dektor Psychological Stress Evaluator as the sole source of, or a major contributor to a determination of truth or deception in a meaningful testing situation.

Be it further resolved that APA officer, directors, and members are authorized to state the following as the official position of the APA:

1. That the PSE-1 is not a polygraph and does not meet minimum standards for polygraph instruments; neither does it meet minimum instrument standards for those states which have established such standards by legislation.

2. That the published standards for the selection and training of PSE-1 examiners do not in any way meet APA requirements.

3. That the published capability of the instrument for surreptitious use constitutes a potential violation of the constitutional rights of the person being examined.

4. That the PSE-1 should not be used in a meaningful testing situation without verification by a trained examiner using an acceptable polygraph instrument.

Mr. MOORHEAD. Thank you again. We appreciate your testimony.

The subcommittee would now like to hear from Mr. Charles R. McQuiston, senior vice president, Dektor Counterintelligence & Security, Inc.; and Dr. John W. Heisse, president, International Society of Stress Analysts, Burlington, Vt.

We welcome you gentlemen.

Mr. MCQUISTON. Sir, we have some documents; I would like to have our secretary bring those up and juggle those documents at the side here——

Mr. MOORHEAD. Is she going to testify?

Mr. MCQUISTON. No, she will not.

Mr. MOORHEAD. All right, do you both solemnly swear that the testimony you are about to give this subcommittee will be the truth, the whole truth, and nothing but the truth, so help you God?

Mr. MCQUISTON. I do.

Dr. HEISSE. I do.

STATEMENTS OF CHARLES R. McQUISTON, SENIOR VICE PRESIDENT, DEKTOR COUNTERINTELLIGENCE & SECURITY, INC., SPRINGFIELD, VA.; AND JOHN W. HEISSE, JR., M.D., PRESIDENT, INTERNATIONAL SOCIETY OF STRESS ANALYSTS, BURLINGTON, VT.

Mr. MCQUISTON. I have a statement——

Mr. MOORHEAD. Before you start, I think this hearing has brought out the differences of opinion of various people engaged in this area—from the American Civil Liberties Union on one side, to the Polygraph Association, which doesn't think much of the stress analysis procedure; and now, of course, you have your day in court.

Mr. MCQUISTON. Yes, sir. Thank you very much. I would like to read my formal statement, and then Dr. Heisse would like to read his, and then we would be open to you for questions.

Mr. MOORHEAD. Let me see. Your statement, Dr. Heisse, is fairly long. I would like to adjourn at——

Dr. HEISSE. Oh, no, sir. This is not my statement. This is just additional information. My statement is a page and a quarter.

Mr. MOORHEAD. Oh. That is the kind of statement that this committee likes.

Mr. MCQUISTON. Ladies and gentlemen, I am Charles R. McQuiston, the senior vice president of Dektor Counterintelligence & Security, Inc. I am a retired lieutenant colonel from the U.S. Army Intelligence Corps. I retired in May of 1970 after more than 25 years of military service. I have been a polygraph examiner for 14 years. I am currently licensed in Virginia, North Carolina, and the State of Florida. I am the coinventor of the psychological stress evaluator, a patented medical system which can be used as a so-called lie detector. Included in my military service was an assignment as a member of the Department of Defense Polygraph Committee which was organized to conduct studies on the polygraph and its role in the Department of Defense.

Many of you will recall that this committee was formed as a direct result of the Moss committee hearings in the mid-1960's.

Today I am responsible for the southeastern region of Dektor;

that is to say, the marketing and training facilities of my company in the Southeastern United States. Dektor is a research and development company founded by Lt. Col. Allen Bean and myself in 1970 upon my retirement from active military service. The majority of the principals in Dektor are retired Army intelligence personnel with particular experience in counterintelligence and countermeasure equipment. Our principal product at this time is the psychological stress evaluator, the PSE, which is being used extensively by police and security personnel as an aid to investigation.

For those of you who are not aware of it, the PSE itself is a device which was designed and engineered to meet a Federal Government requirement for an advanced interrogation system capable of accomplishing detection of deception without the use of attached body sensors and without causing physical or mental harm to the subject.

The PSE uses the human voice as the carrier of certain physiological changes occurring in the human body although research to date indicates that it will function on any physiological sound made by any member of the animal kingdom. The PSE definitely measures and records physiological changes effected by the autonomic nervous system such as respiration and cardiovascular changes as well as monitoring and displaying changes in a phenomenon called the muscle microtremor believed to be generated and controlled by the central nervous system. The PSE is quite easy to operate and the charts it produces are easily read. The contribution the PSE has made to forensic science, medicine, and law are well documented. The system has been thoroughly tested in and out of house in a variety of applications. Certain of these documents pertaining to the use of the PSE and its test results have been provided to you and included in this document package are statistical breakouts pertaining to 39,329 PSE cases which have been conducted or obtained from approximately 8 percent of our customer population as of June 1.

That is the end of my formal statement. I turn now to my colleague.

Mr. MOORHEAD. That was very well and briefly stated. Your full statement will of course go in the record.

[Mr. McQuiston's prepared statement follows:]

USE OF LIE DETECTORS
BY THE FEDERAL GOVERNMENT

An Informational Report

Prepared For

THE

FOREIGN OPERATIONS AND GOVERNMENT

SUBCOMMITTEE

of the

COMMITTEE ON GOVERNMENT OPERATIONS

THE CONGRESS of the UNITED STATES

BY

DEKTOR Counterintelligence and Security, Inc.

Springfield, Virginia 22151

4 June 1974

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An Information Report
Prepared For
THE
FOREIGN OPERATIONS AND GOVERNMENT SUBCOMMITTEE

I. Introduction.

The purpose of this paper is to aid the Foreign Operations and Government Information Subcommittee of the Committee on Government Operations, Ninety-Third Congress, CONGRESS OF THE UNITED STATES, in developing a body of Knowledge about polygraphs and other devices that are now being promoted as having similar capabilities as "lie detectors".

The contents of this document will discuss, inregard to "lie detectors", the following aspects which are considered to be of paramount interest to the Subcommittee:

1. Legality of use.
2. Necessity of use.
3. Morality of use.
4. Validity.
5. Reliability.
6. Limitations of Known "lie detectors".

General information is presented in the body of this advanced copy (50 copies provided), with detailed information attached as Annexs for more detailed study. Questions not answered by this document to the satisfaction of members of the Subcommittee are invited to be given to the representative from this firm, during his testimony, or directed to this firm at anytime.

II. Definitions and Limitations

The basis upon which "lie detection" is founded is the cause and effect of psychological stimuli and physiological response. In recent years, recognition of the important interrelationship between these two branches of human science has given rise to psychophysiology, as a separate discipline.

The existence of such relationships has long been recognized. Two general types of exploitation of these relationships have developed. The first of these is the causation of programmed response to psychological stimuli, which has been most notably documented by Pavlov in his experiments with conditioned responses. This has provided some basis for such divergent fields as applied psychology, advertising and hypnotism.

The second general type of exploitation of the psychophysiological relationships involves the identification and measurement of physiological changes resulting from psychological changes. This approach is used largely in medical and psychological research and diagnosis, and in "lie detection". Quite a number of physical changes have proved useful, with various degrees of reliability - some having been recognized for centuries. Some of the physiological responses which are currently considered indicative of psychological change include salivation rate, pulse rate, blood pressure, brain waves, eye pupil diameter, infrared radiation from the skin, breathing pattern, carbon dioxide, content of exhalation, chemical content of perspiration, and amplitude of physiological tremor (muscle micro-tremor).

Two general methods of recognition and evaluation of these activities are employed. When the physiological responses are sufficiently great, some subjective evaluations can be made by a trained observer; however, far more accurate evaluations can be made by instrumentation able to detect and accurately measure relatively small physiological changes.

The consistantly objective aspect of what is termed "lie detection" is based upon these psychophysiological relationships. Over a considerable number of decades, it has been established empirically that a person's psychological set undergoes a change when he tells a significant lie, just as it has been determined in transactional analysis that a person's psychological set changes when he feels pleasure, displeasure, anxiety, etc.

The more subjective aspect of "lie detection" is the analytical processes on the part of the examiner which equates the physiological manifestations of psychological change to deception as opposed to other possible stimuli. "Lie detection", therefore, must be considered part science and part art, just as is instrumented medical diagnosis. "Lie detection" is a system composed of the instrument being used, the examiner, the controls exercised, and the subject. Over the years since the patents were issued to Leonard Keeler for the Polygraph, considerable efforts have been made to bring the variable qualities under control. Much of this has been accomplished in the profession, itself, by research by individual examiners, by responsible training schools, and by professional societies. Legislation by some of the states has assisted in the establishment of certain criteria or minimum standards which must be met. Probably of greatest significance, as far as the federal government is concerned, was the establishment and adherence to examiner standards as a result of the Moss Committee investigations in the mid-1960's.

Each element of the system has been subjected to improvement processes over the years. The polygraph, although relatively unchanged in the principles of its basic elements, is a far more consistantly reliable device today than it was 40 years ago. Experimentation with instrumentation other than the basic cardiographic, pneumographic, and GSR measurements has improved the system both by drawing upon the knowledge gains in psychophysiology and by adding to them. An example is Dektor's development of the Psychological Stress Evaluator (PSE) in 1970, with resultant advances, through field research and use, in psychophysiology, clinical and research psychology, and psychiatry, as well as "lie detection".

Test formulation, largely the key to discriminating between the psychological stresses associated with attempted deception and other stress causes has vastly increased in validity with the continuing research by, among others, Cleve Baxter, Richard Golden, Morton Sinks, Richard Arthur, John Reed, and we hope our own senior PSE instructor personnel, Charles McQuiston and Michael Kradz, both Polygraph examiners of many years experience.

With the experience of over 40 years, chart interpretation has improved, inspired, to some degrees, by the increasing requirements for non-specific testing in personnel security screening in the federal government and pre-

employment screening in industry, both which normally require attention to lower stress levels than does specific-crime testing.

In spite of the magnitude of the advances made over the years, many misconceptions still exist, one of the most unfortunate of which, we believe, is the use of the term "lie detector"; particularly when applied to an instrument such as the Polygraph of the Psychological Stress Evaluator. The instruments measure certain physiological changes which are attributable to psychological changes. The instruments can not distinguish between changes caused by attempted deception and other psychological stimuli. The examiner, properly trained, using an appropriately formulated test which incorporates such necessary control elements as guilt-complex response questions and outside-issue questions, can make this discrimination to an extremely high confidence level. If there is a "lie detector", it is more properly the examiner than the instrument.

Because there is this human element, (partly subjective) involved, we prefer the avoidance of the terms "lie detector" and "lie detection" and the absolutes which they imply. We prefer the term "stress-analysis" and the philosophy which it implies. Specifically we look upon the so-called "lie detection" examination as an opportunity to establish the veracity of the subject, by virtue of lack of stress at significant points or, where such stress is present, as a pointer toward more focused interview, interrogation, or investigation. As a result of this point of view, Dektor does not support the acceptance of results of examinations as <u>prima facie</u> evidence of guilt in criminal cases, primarily because we do not feel that such acceptance is necessary. If these techniques can be used to identify the truthful and the innocent, the investigative agencies can focus investigation on the remaining suspects and establish their guilt or innocence by means of the time-honored adversary system.

In subsequent portions of this paper we will examine validity, reliability, legality, morality, and necessity. In regard to validity and reliability, we will address ourselves primarily to the Psychological Stress Evaluator, since field statistics and study results for this more recently developed equipment have not yet received wide dissemination. Further, it is expected that other witnesses will address these subjects, as they pertain to the Polygraph.

III. Validity and Reliability.

For the reasons previously stated, in this section we will concentrate primarily on validity and reliability, as it pertains to the Psychological Stress Evaluator.

The Psychological Stress Evaluator (PSE) is an instrument which produces chart tracings which display levels of stress experienced by the examinee at the moment of utterance. The responses are tape-recorded and the recording is processed through the PSE to chart and display inaudible stress related voice components. The source of these components is the physiological tremor (muscle micro-tremor) existing in the muscles controlling the exhallation during the vocalization of the response. (For more detailed data, see Annex A.)

The establishment of validity (i.e., how well does it do what it purports to do?) presents potential problems which are similar to those faced over the years by the Polygraph: that is, the disparity between field data and laboratory test results. To a large degree, this problem of establishing Polygraph validity has been a product of the misconception that the Polygraph instrument is a "lie detector". If it is a "lie detector", then, when a person lies, whatever the circumstances, it should detect it. As previously stated, the Polygraph and the PSE are instruments which measure stress levels or changes in stress levels. If the examinee stresses, or changes level of stress, the instruments will display it; if he does not, they will not. We know that, when a person tells a significant lie (i.e., one which involves morality or possible jeopardy) he will respond predictably. If he honestly believes what he is stating, or if the lie is of little significance to him, he very well may not. This latter situation, the lack of significance of the lie, has been the historical problem in the hypothetical situations in laboratory testing and has produced wide variations in resultant findings.

Because of the wisdom derived from this history, most of the validation testing of the PSE in the laboratory has been from the standpoint of its ability to detect the presence of stress and changes in stress level. Most of this type of testing has been directed toward validation for the instrument's use in medical, psychological, and psychiatric applications, rather than "lie detection", which is an interpretative process. (Results of these studies appear at Annexes D through H.)

For the most part, validation of the PSE for "lie detection" has been accomplished during field employment in real-world situations by independent agencies, many of which have maintained records which allow cross-correlation between PSE findings and results proved by verified confession of the examinee or persons other than the examinee, by medical examination, or by other definitive physical evidence that may have been developed subsequently. Additionally, in many cases, the same examinations were run with both the polygraph and the PSE to allow a comparative evaluation between the two instruments and their respective systems. A brief summary of the results of field-validation testing appears at the end of this section. We are including all data available to us, favorable and unfavorable at Annexes B and C. This latter category is limited primarily to a study performed by Joseph Kubis of Fordham University, under contract to the U. S. Army Land Warfare Laboratories. This study exemplifies the problems of the hypothetical laboratory test among other things. It is treated in detail at Annex I. A review of PSE validation studies appears at Annex J.

Obviously, validation achieved as described by statistical data from field employment includes the reliability component (does it do what it does with repeatable consistency?). Additionally, it must be recognized that this method of establishing validity and reliability is a system evaluation, rather than component evaluation. Ultimately, this is what is important. It is the system in its entirity to which the examinee is subjected.

I seems appropriate, at this point, to describe some of the actions which have been taken to establish and maintain the validity and reliability of the PSE examinations.

Dektor, so far as we know, is the only manufacturer of equipment used for the detection of deception which requires that the prospective purchaser satisfactorily complete company approved training. We do not take this self-imposed requirement lightly; we have refused sales on this basis, and we have required less than satisfactory students to repeat the training before purchasing. We maintain a free consultation service with our customers and provide, as a standard component of the PSE system, the means for the PSE user to transmit tapes to us by telephone for immediate confirmation of their findings. We have, on several occasions, brought PSE users back for additional refresher training, at no cost.

The basic PSE course is termed an Orientation Course and has, as its stated purpose, the objective of training the student to use the PSE in his profession. The course is a high-intensity course of three days with out-of-the-classroom requirements for the two nights. We consider this as Phase I of the training. Phase II is the continuing consultation and, when necessary, the retraining. We have had remarkable success with this program. We also have a two-week course available at our Florida facility, for students who require training in interview and interrogation. The cost of the three-day Orientation Course is included in the purchase price of the system; the cost of the two-week course is not.

Some Polygraph Examiners, who have not taken the PSE training, have expressed surprise, perhaps incredulity, at our success in training with considerably shorter classroom time than that which is normal for the Polygraph. The simple truth is that the PSE is simpler to use and the charts are easier to read. Although the Polygraph is still a very effective instrument, it was developed with 1920's technology and the PSE with 1970's technology. Much of the chart-reading simplification is the result of technilogical advances in signal processing during the ensuing years.

As the Polygraph gave rise to the American Polygraph Association, a professional society chartered to establish and influence the maintenance of standards for the Polygraph profession, the PSE have given rise to the International Society of Stress Analysts, a professional society which is chartered to establish and influence the maintenance of standards for the functional discipline of stress analysis, without equipment orientation. Many of our customers are members of both organizations. Both of these organizations are instrumental in the attainment and maintenance of validity and reliability for the "lie detection" systems.

The reliability of the PSE instrument has been addressed, as well. The original model, the PSE-1, handled the problem of verifying instrument reliability with a standard test tape and calibration charts. The subsequent model, the PSE-101, is provided with internal calibration signal circuitry which allows on-the-spot field testing of equipment reliability by pressing a test button and charting the results in the four modes of operation.

Because of our continuing contact with Psychological Stress Evaluator users in the field, we are aware, on a continuing basis, of their problems and successes. We are also aware that a number of PSE users, who are also polygraph users, had run series of simultaneous tests for their own in-house validation of the PSE. While we were aware of the general results of field usage, we did not have sufficiently detailed data to present it formally; so, when the requirement for this document was established, we querried the field for such data. The data received was limited by the rapid response requirement and by the types of records maintained by the respondents.

423 users were querried and, as of our 1 June cut-off, 46 responses had been received, reporting on 39,329 PSE examinations. Of these, 5,579 involved both PSE and Polygraph testing in the same examinations.

Not all respondents were able to provide data in answer to all questions; however, in every case the examinations evaluated provided samplings in the thousands.

The complete study appears at ANNEX C. Significant findings are included in summary fashion here.

1. Based upon 5,045 simultaneous polygraph/PSE examinations for which all data was presented, the two systems were in agreeement 5,037 times, for a correlation of 99.84%.

2. Based upon 10,202 PSE examinations conducted by responders who so stated, there was not one case in which the PSE had been found in error, as a result of independent evaluation. Of these, 2,285 examination findings were positively corroborated by independent evaluation.

3. In 3,286 cases involving criminal or specific issue, in which complete data was provided, the examinee was cleared (found innocent) in 2,264 cases, or 68.9%.

This study presents additional information which may be of general interest.

IV. Morality and Necessity

In the 1965 report of the committee on Government Operation, Subject, Use of Polygraphs As Lie Detectors By the Federal Government, the moral issue on the use of the polygraph was the subject of considerably debate. A member of the Foreign Operations and Government Information Subcommittee, which conducted the initial study, the Honorable Donald Rumsfeld, presented a dissenting view (See Annex K). He has stated that, "There is lack of evidence citing specific instances of harm to the individual within the Federal Government. It's my conclusion that while the research and study concerning the polygraph is necessary and desirable, the agencies of the Federal Government should not be denied the use of the polygraph as an investigative tool, pending completion of these studies. For this reason I must dissent from this report. Throughout the history of this country, the pendulum of Government action, whether executive, legislative, or judicial, has moved between the two equally undersirable extremes of excessive protection of the rights of the individual at the expense of society as a whole and the excessive protection of society at the expense of the individual. Each is equally important. A delicate balance between the two is desirable, but difficult to maintain. As society changes, we must be alert to see that the pendulum does not move to either extreme. At this point in history, it is my conviction that the pendulum has moved off balance, and that this report could further upset the balance to the detriment of society as a whole. He further stated that, "The evidence before the subcommittee indicates that Government investigators do not conclude that persons are lying or are confessing guilt solely on the basis of polygraph readings. Rather, it is my understanding that they properly regard the polygraph as simply one aid in investigation. A few agencies involved in top secret matters also use the polygraph on certain occasions to screen the backgrounds of persons seeking employment. As the Assistant to the Director of the FBI stated at the hearings:

> 'The polygraph is just an instrumental device to assist the interrogator, but the technique is basically an interview, an interrogation, a trained skilled interrogator attempting to get the truth from an individual in a matter in which we have juridiction.'"

There has been considerable discussion on both pro and con, on the use of "lie detectors" since the 1966 committee report. The continuing evidence of an increasing crime rate, the partial break down of our judicial system caused by the heavy overload of cases in our courts, should be sufficient evidence to lead us in the conclusion that the same pattern of unbalance discussed by Mr. Rumsfeld continues. The rights of the individual are protected by the amendments to the U.S. Constitution. However, an individual does not have the right to interfere with another's rights whether that be one person or society as a whole. There is a need for individual integrity as well as constrictions on society. The individual has the right to prove himself innocent of a crime and an employer has the right to hire the most qualified individual for a position. Both of these rights can be maintained. But, sophisticated efforts are needed to counteract the increasingly sophisticated criminal behavior. Reliable investigative aids are needed to assist in combating the high crime rate. We believe that the PSE and the polygraph are such tools.

There is another aspect of morality and necessity that is frequently overlooked. Honest people sometimes need a means which allows them to be believed, or accepted on faith, when their veracity is questioned or cannot otherwise be determined. Employees can become trusted employees after a number of years of demonstrating a lack of evidence to the contrary. Once they achieve trusted employee status, they may be allowed to perform in a position of trust with considerably less continuing observation and redundant checks by duplicative work on the part of other employees and supervisors. They become more valuable to the system in which they are employed when the attained trust allows them to move more rapidly and more freely. They are better able to attain promotions commensurate with their abilities and capabilities.

If by means of personnel security screening for positions of trust, the honest prospective employee can have his trustworthiness established to any usable degree at a preliminary or an early stage, the agency employing him benefits, of course, but equally as important, the employee benefits.

Congressman Rumsfeld further stated, "little or no evidence was uncovered where a polygraph examinee had been falsely accused or otherwise harmed through a polygraph examination administered by a Federal agency". The overwhelming majority of such examinations serve the useful, perhaps essential purpose of establishing that the employee or prospective employee is honest and trustworthy and allow him and the employing agency to derive the benefits of that knowledge. Of all the individual rights which are so frequently discussed, perhaps the most important in any stratum of life is for the trustworthy to be trusted.

V. Legality.

It does not appear, at the present, that the legality of instrumented "lie detection" is at issue. It is difficult to see where, within the Consitution or its amendments there are constraints that would make "lie detection" unconstitutional, except as the Fifth Amendment and its interpretations treat involuntary self-incrimination in criminal matters.

The legality of "lie detection" has been acknowledge by the establishment of controls by the majority of the states. These states apparently have recognized the need for the protection of a person's rights while at the same time recognized that properly used "lie detection" is an investigative tool to aid in the protection of the rights of others, whether it be a single individual attempting to prove his innocence or society as a whole in the form of protection of the public.

Some of the states have enacted legislation by which standards are to be used in detection of deception. This is accomplished by state controlled licensing of examiners. There is a general format for the states laws as they exist now in regards to the education, training and type of instrumentation that is to be used.

The remaining states have established laws which state the conditions under which an examination for detection of deception may be conducted.

VI. Limitations of the Psychological Stress Evaluator in "Covert Lie Detection".

Limitations which exist in the unqualified detection of a lie, without regard to the situation, have been discussed in Section II. Because of the nature of the medium employed in PSE analysis, the subject of "covert lie detection" must be addressed, if for no other reason, because of some misinformation and fallacious assumptions which have been made in the news media over the past two years.

Because the PSE uses the voice as a medium for stress measurement, the question has been raised concerning the ability to detect attempted deception or truthfulness from television or radio broadcasts. It is indeed a fact that the PSE can be used to determine stress levels on the part of the speaker under these circumstances. However, as has been discussed previously, "lie detection" is an interpretative or analytical process which requires certain control elements to allow equating the stress indicating to attempted deception, as opposed to any other stress cause. Without these controls appropriate pre-test, properly structured examination, and post-test interview indications of stress remain just that. It would be interesting, indeed, if "lie detection" could be accomplished under such circumstances, but it can not.

ANNEXES

A. Description, Patent Information: Psychological Stress Evaluator

B. Study - The Psychological Stress Evaluator - Kradz

C. Field Use of the Psychological Stress Evaluator - Compiled by DEKTOR based on Questionaires - Dahm

D. Analysis of the Voice - Smith

E. Stage Fright and Steven's Law - Brenner

F. Use of Voice Changes in the Detection of Deception - Barland

G. Early Validation Study with Psychological Stress Evaluator - Worth and Lewis

H. Comparison of Voice Analysis and Polygraph as Lie Detection Procedures - Kubis

I. Critical Analysis of Kubis Report - Dektor

J. A Review of Psychological Stress Evaluation Validation Studies - Dektor

K. Views of the Moss Report - Rumsfeld

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PSYCHOLOGICAL STRESS EVALUATOR

This invention relates to the detection and measurement of psychological stress and, more particularly, to the measurement of psychological stress at levels below those discernible without instrumentation and the measurement of psychological stress without the use of applied or visible sensors.

The existence of the relationships between psychological states and physiological responses to such states has long been recognized. Two general types of exploitation of these relationships have developed. The first of these is the causation of programmed response to psychological stimuli, which has been most notably documented by Pavlov in his experiments with conditioned responses, and has provided some basis for such divergent fields as applied psychology, advertising, and hypnotism. This type of exploitation of the psycho-physiological relationships is only supplementally involved with the present invention.

The second general type of exploitation of the psycho-physiological relationships involves the identification and measurement of psychological changes by identifying and measuring resultant physiological changes. This approach is used largely in medical and psychological research and diagnosis, and in lie detection. Two methods of evaluation are used. When the responses are sufficiently great, some subjective evaluations can be made by a trained observer; however, far more accurate evaluations can be made by instrumentation designed to detect and measure relatively small degrees of physiological change. Those physiological changes most usually considered are brainwave patterns, heart activity, skin conductivity, and the breathing activity. While the measurement of these activities does provide a far more accurate evaluation of physiological response than does direct observation, it introduces several disadvantageous features. The most functionally serious of these problems is the artificiality of the testing situation caused by the requirement for sensors to be attached to the subject of the examination, the controlled environment usually required, and resultant restrictions on the normal activity of the subject. These requirements can be expected to induce a psychological set in the subject which, in some cases, may be as strong as or stronger than the psychological set which is to be evaluated, thereby substantially reducing the validity of the evaluation.

It has been an objective of this invention to achieve a method for psychological stress evaluation which avoids the testing and evaluation constraints imposed by the existing requirements for obvious and attached sensors.

It has been a specific objective of this invention to use the human voice as the medium which provides the physiological response to psychological change - inasmuch as the use of this medium resolves the existing problems of attached sensors, elaborate equipment, and highly controlled environment in association with the subject; inasmuch as this is the one physiological medium which can be transmitted over distances by existing and readily available techniques (telephone and radio); and inasmuch as this is the one physiological medium which can be recorded simply as a completely valid and comprehensive analog of the medium (e.g., by tape recording).

The basic physiology of the human voice, as heretofore understood, produces two types of sound. The first of these is a product of the vibration of the vocal chords, which, in turn, is a product of partially closing the glottis and forcing air through the glottis by contraction of the lung cavity and the lungs. The frequency of these vibrations may vary generally between 100 and 300 Hertz, depending upon the sex and age of the speaker and upon the intonations the speaker applies. This sound has a rapid decay time.

The second type of sound involves the formant frequencies. This is sound which results from the resonance of the cavities in the head (throat, mouth, nose, and sinus cavities). This sound is created by excitation of the resonant cavities by a sound source of lower frequencies, in the case of the vocalized sound produced by the vocal chords, or by the partial restriction of the passage of air from the lungs, as in the case of unvoiced fricatives. Whichever the excitation source, the frequency of the formant is determined by the resonant frequency of the cavity involved. The formant frequencies appear generally above 800 Hertz and appear in distinct frequency bands which correspond to the resonant frequency of the individual cavities. The first, or lowest, formant is that created by the mouth and throat cavities and is notable for its frequency shift as the mouth changes its dimensions and volume in the formation of various sounds, particularly vowel sounds. The higher formant frequencies are more constant, because of the more constant physical volume of the cavities. The formant waveforms are ringing signals, as opposed to the rapid decay signals of the vocal chords. When voiced sounds are uttered, the voiced waveforms are imposed upon the formant waveforms as amplitude modulation.

A third signal category in the human voice has been uncovered during the research leading to this invention. This is an infrasonic frequency modulation, present, in some degree, in both the vocal chord sounds and in the formant sounds. This signal is typically between 8 and 12 Hertz, therefore, it is inaudible to the human ear. As frequency modulation, as opposed to amplitude modulation, it is not directly discernible on time base/amplitude chart recordings. Because this infrasonic signal is one of the more significant voice indicators of psychological stress, it will be dealt with in greater detail.

There are several analogies which are used to provide schematic representations of the entire voice process. Both mechanical and electronic analogies are successfully employed; for example, in the design of computer voices. These analogies, however, consider the voiced sound source (vocal chords) and the walls of the cavities as hard and constant features. As opposed to these analogies, both the vocal chords and the walls of the major formant-producing cavities are soft flexible tissue immediately responsive to the complex array of muscles which control them. Those muscles which control the vocal chords thru the mechanical linkage of bone and cartilage allow both the purposeful and automatic production of voiced sound and variation of voice pitch. Similarly, those muscles which control the tongue, lips, and throat allow both the purposful and the automatic control of the first formant frequencies. Other formants can be affected similarly to a more limited degree. It is worthy of note that, during normal speech, these muscles are performing at a small percentage of their work capability. For this reason, in spite of their being employed to change the position of the vocal chords and the position of the lips, tongue, and inner throat walls, the muscles remain in a relatively relaxed state. As a result of research conducted for this invention, it has been determined that during this relatively relaxed state a natural muscular undulation occurs at the typically 8 to 12 Hertz frequency previously mentioned. This undulation slightly varies the tension of the vocal chords and causes audibly indiscernible shifts in the basic pitch frequency of the voice and it slightly varies the volume of the resonant cavity (particularly that associated with the first formant) and the elasticity of the cavity walls to cause audibly indiscernible shifts in the formant frequencies. These shifts about a central frequency constitute a frequency modulation of the central or carrier frequency. In order to observe this frequency modulation, any of the several existing techniques for the demodulation of frequency modulation may be employed, bearing in mind, of course, that the modulation frequency is the nominal 8 to 12 Hertz and the carrier is one of the bands within the voice spectrum. Figure 1 depicts pulses of the amplitude modulation of formants by a voiced signal of 190 Hertz, resulting from 2.5 Kilohertz high-pass filtering of the voice of an unstressed subject and the contained infrasonic frequency modulation observable in the center-of-mass waveform. A simple slope detection was made of the unlimited infrasonic waveform of a syllable utterance.

It has been determined, further, that the array of muscles associated with the vocal chords and the cavity walls are subject to mild muscular tension when slight to moderate psychological stress is created in the subject. This tension, indiscernible to the subject, is sufficient to decrease or virtually eliminate the muscular undulations present in the unstressed subject, thereby removing the basis for the carrier frequency variations which produce the infrasonic frequency modulation. Figure 2 depicts a similar utterance as that of Figure 1, but at a time of induced psychological stress. In this case the center-of-mass waveform can be seen to be essentially devoid of the infrasonic variations observed in the unstressed utterance in Figure 1, even though all other test factors and the demodulation procedures were held constant.

While the use of the infrasonic waveform is unique to the use of voice as the physiological medium for psychological stress evaluation, the voice provides for additional instrumented

indications of aurally indiscernible physiological changes as a result of psychological stress, which physiological changes are detectable also by current means. Of the four most usually considered physiological changes previously mentioned (brainwave patterns, heart activity, skin conductivity, and breathing activity), two — breathing activity and heart activity — directly and indirectly affect the amplitude and the detail of an utterance waveform and provide the basis for a more gross evaluation of psychological stress, particularly when the testing situation involves sequential vocal responses. Figure 3 depicts a test in which psychological stress was induced in a female subject by having her utter a hypothetical lie in a Peak of Tension test, in which she responded, "I did not choose that letter" for each of a series of 12 letters, one of which, in fact, she had selected. The chart displays an aggregate of pneumographic, cardiographic, and, to a lesser degree, infrasonic influence. The signal for this display has been highly integrated to show more clearly the gross aggregate effect. This technique is particularly useful in determining stress zones in longer statement runs, by avoiding waveform complexity. This chart, the 12 letter series from K to V, shows the following significant features which are indicative of physiological changes caused by the attempted deception.

There is a marked constriction at K which reflects the beginning-of-test tension normal in most overt testing situations. Normally, this initial tension would dissipate at L unless the set of the individual were such that the initial tension is reinforced by the tension of anticipating the approaching lie. Such is the case in this test, and tension is seen to continue at M, N, and O, the point of deception. In addition to the observable effects of the infrasonic signal (which is normally present in relaxed speech but attenuated or absent in stressed statements) there are certain more usual physiological indicators also present which portray the changing emotional pattern of the individual, these are supression/hyperventilation, diction stress, and significant delays in response time. The pneumographic influence gives the greatest indication of relief after the point of deception in that a noticeable increase of amplitude is indicated at the point where the individual passed the point of deception and began to compensate for the decrease in oxygen/carbon dioxide exchange occuring at K through O. Beginning at P the relief experienced by subject is evident through the remainder of the chart with the partial exception of Q, which can be expected as a momentary fear on the part of the subject that relief at P may have been evident audibly to the examiner.

Additionally, there are certain diction stresses which may be evident as a progressive change in an individual pattern. This may or may not be audible as subject exercises abnormal control over his diction in an attempt to maintain a static speech pattern. These indications include minor changes in individual syllable stress and changes in the concatenation patterns in the separate responses. These indicators are largely responsible for the waveform pattern (as distinguished from amplitude) of the individual response displays; they follow a slightly different progression to O, the point of deception, in that they are not as much involved with the beginning-of-test stress demonstrated by the lower amplitude at K, but cause an increasingly less complex display up to N and O, and suddenly return to their complexity with the marked psychological relief at P. With the exception of Q (for the reason previously discussed) this non-stressed pattern continues throughout the remainder of the test.

It should be noted that the opposite configuration may occur, that is, the stress may be indicated by high amplitude and a multi-form trace while relief may be shown by a drop in amplitude and a more simple pattern. This, of course, depends upon whether a given individual responds to a given psychological stimulus with excitation or depression. While the general indicators of stress and relief may differ from test to test, they are relatively stable within any individual test and, of course, the infrasonic indicator remains constant from test to test and from individual to individual.

Figure 4 depicts an expansion of the N-O-P portion of this Peak of Tension test to show the somewhat constrained infrasonic waveform at N, as the tension is increasing, the more greatly constrained infrasonic waveform at O (the "lie") and the presence of the infrasonic waveform at P, as a result of psychological relief.

Figure 5 depicts similar portions of two narrative-type utterances made by a subject under unstressed conditions (5a) and under conditions of induced mild anxiety (5b). As has been indicated in the previous examples, the infrasonic waveform is obvious in the unstressed utterance and is greatly attenuated in the stressed utterance.

While the above descriptions and examples deal with the psycho-physiological relationships from the standpoint of an overview, those who are knowledgeable in these areas will readily recognize the functions of the endocrine glands, and the sympathetic and parasympathetic nervous systems in completing the course between the psychological stimulus and the several physiological responses involved in this invention. Similarly, while the details of the physiology of the larynx and the resonant cavities of the throat and head have been described only to the point deemed necessary to support the techniques and findings, those persons versed in human physiology will be aware of the well-known physical features involved in these areas.

FIG. 1

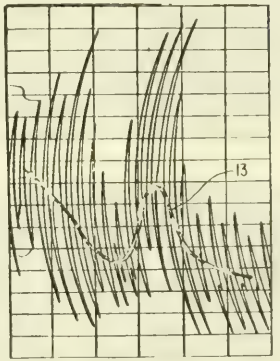
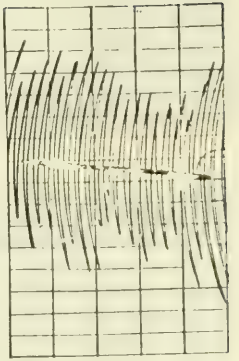


FIG. 2



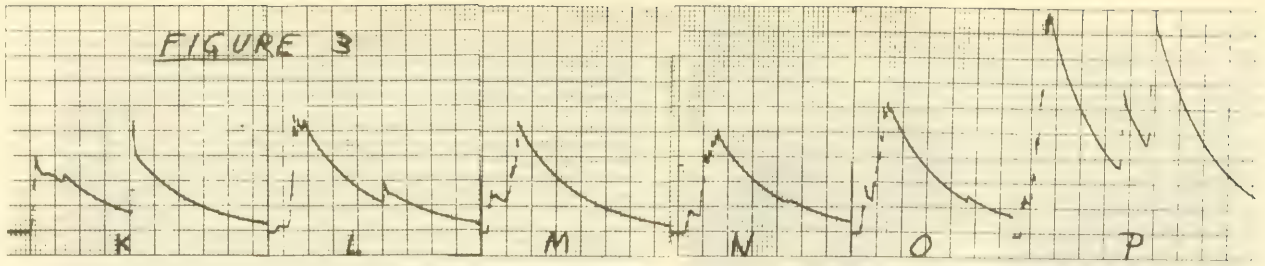


FIGURE 3
K
L
M
N
O
P

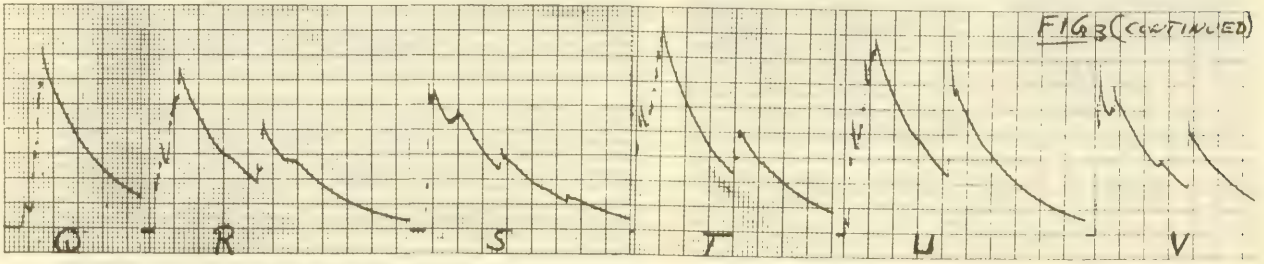


FIG 3 (CONTINUED)
Q
R
S
T
U
V

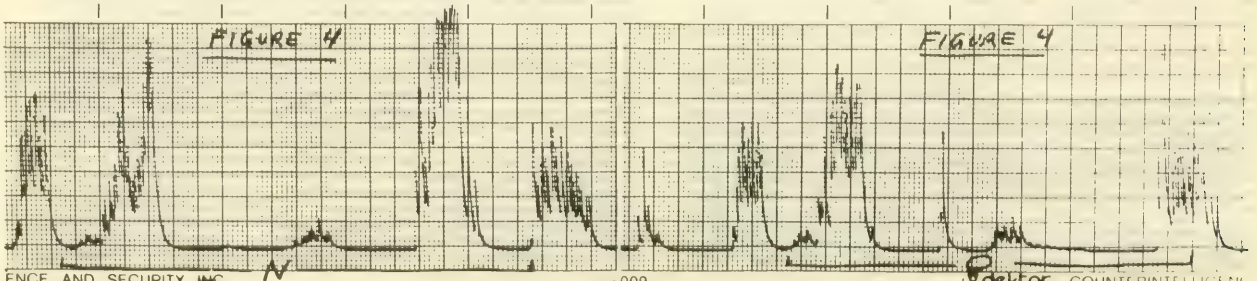


FIGURE 4
FIGURE 4
W
X
ENCE AND SECURITY INC.
PRINT 009
Vektor COUNTERINTELLIGENCE

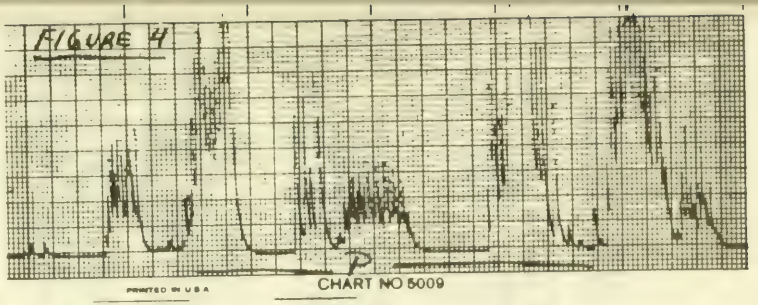


FIGURE 4
CHART NO 5009

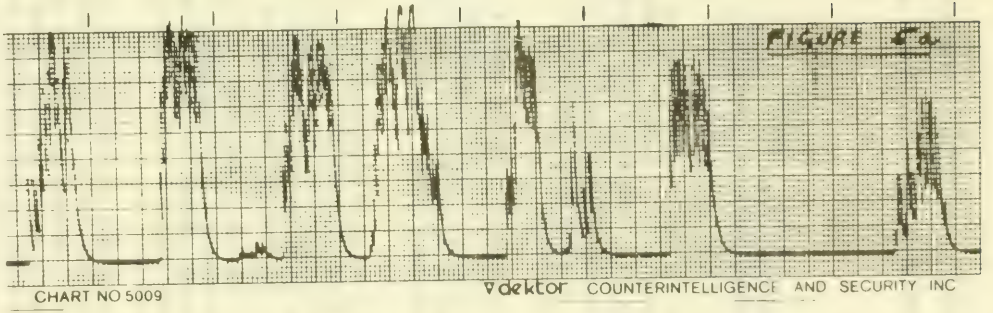


FIGURE 5a
CHART NO 5009
Vdektor COUNTERINTELLIGENCE AND SECURITY INC

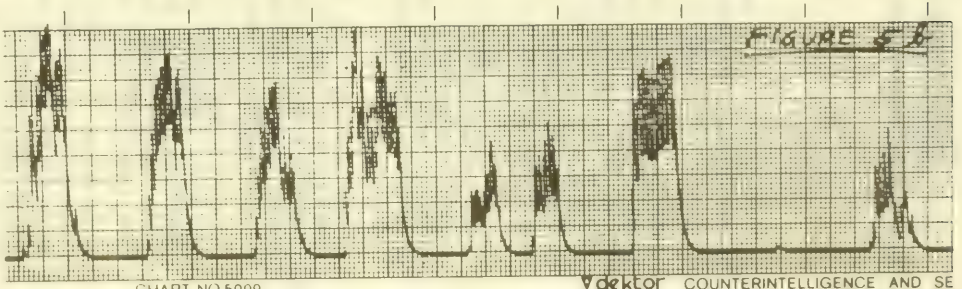


FIGURE 5b
Vdektor COUNTERINTELLIGENCE AND SE

dektor

COUNTERINTELLIGENCE AND SECURITY, INC 5508 Port Royal Rd.,Springfield, Va. 22151

703 569-2900

The PSE (PSYCHOLOGICAL STRESS EVALUATOR) is an instrument that detects, measures and graphically displays certain stress-related components of the human voice.

Superimposed on the audible voice are inaudible frequency modulations. The FM quality of the voice is susceptible to the amount of stress that one may be under when speaking. To the human ear, a person may sound perfectly normal, free of tremors or "guilt-revealing" sound variations. The PSE senses the difference and records the changes in the inaudible FM qualities of the voice on a chart. When the chart is interpreted by an experienced examiner it reveals the key stress areas of the person being questioned.

The human body has two nervous systems - central nervous system and autonomic nervous system (and their various subdivisions). In each of these there are voluntary and involuntary reactions: those reactions controlled by the brain (voluntary) or those not controlled by the brain (involuntary, or reflex actions). The PSE is designed to detect the inaudible effect on the human voice of the involuntary reactions.

When one speaks the voice has two modulations - audible and inaudible. The audible portion is what we hear. The inaudible modulation comes from the involuntary areas (those not totally controlled by the brain or thought processes). Internal stress is reflected in the inaudible variations of the voice. These differences cannot be heard, but they can be detected and recorded by the PSE.

The key to successful use of the PSE is the preparation of simple selected questions keyed to the individual and structured to reveal normal or truthful answers and answers that are false. Once the personal pattern has been established any evasive or false answers reveal stress; if a person is not telling the truth then analysis of his voice pattern will show it.

The PSE has two great advantages over any similar instrumentation. First is its simplicity; it has few moving parts and is relatively easy to learn to operate. Second, the PSE does not have to be used at the time of the interview or interrogation. A tape recorder is used to make a permanent record of the interview. The tape is later fed into the PSE and the voice reactions recorded on the chart. Our examiners frequently make tape recordings for clients over the telephone, run the tape on the PSE and notify the client of the results of the test.

The instrument has multiple uses: i.e., pre-employment screening, determining theft, employee morale, efficiency or criminal activities. Over 500 are now in use by doctors, lawyers, criminologists, law enforcement officials and varied commercial organizations.

THE PSYCHOLOGICAL STRESS EVALUATOR

A Study

by

Michael P. Kradz
Howard County Police Department
Ellicott City, Maryland

1972

THE PSYCHOLOGICAL STRESS EVALUATOR

A Study
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The recognized principle of involuntary physiological changes related to psychological stress has a practical application in law enforcement. The instrumentation and measurement of physiological stress, as induced by fear, anxiety, conflict and the complex emotion of guilt, have been used to facilitate the detection of attempted deception on the part of a witness or suspect. This "lie detection" process has become a valuable investigative tool, providing leads to substantiating evidence for the prosecution, and on numerous occasions serving to point up the inadequacy of evidence against a suspect and to influence or effect his release from incarceration.

During eight years in his capacity as Chief Polygraph Examiner for the Howard County, Maryland, Police Department, services of the present writer in detection of deception have also been utilized by offices of the Federal Bureau of Investigation, Maryland States Attorney, Maryland Fire Marshall, and the Maryland Public Defender.

The "lie detection" situation is a system having four components: an examinee who makes predictable responses to stress, a measuring device to record those responses, a structured examination for control, and an examiner who conducts the interviews and evaluates the causes of the displayed stress. It is the function of the structured examination to provide for comparison, controlled examples of non-stressed and stressed reactions, to assist in the identification of the causes of any uncontrolled stress reactions occurring. This identification which results from post-test discussion and possible re-testing, is a process of eliminating all possible causes of stress other than attempted deception.

The usual instrumentation used in the "lie detection" application, and that which has been used by this examiner, has been a polygraph, which measures three physiological changes generally conceded to accompany psychological stress. These are changes in cardiac activity, changes in rate and depth of respiration, and changes in skin resistance, hypothesized by some to represent variation of moisture of the skin. There are, however, some problems with the polygraph. Some people's reactions are incapable of being recorded for reasons of obesity or other medical conditions inhibiting attachment of

the sensors required to take various measurements. Some others become so reactive to the attachment of the pneumo sensor around their chest, or the blood pressure cuff tight around their arm, that their chart will show stress throughout, without sufficient differentiation to provide a readable polygraph chart.

Because of the possibility of some very real advantages over the present instrumentation, the writer's interest was aroused on learning of the availability of a new form of stress instrumentation, the Dektor Psychological Stress Evaluator (PSE), which uses the human voice as the medium. The PSE measures stress-related changes in frequency modulation carried by the audible voice frequencies. A tape recording of the examination is electronically processed through the PSE, with a graphic read-out of the degree of stress or non-stress in the examinee's voice as he replies during the structured examination of the "lie detection" system.

To be considered for use in the "lie detection" application, any instrument must meet the following criteria:

a. The physiological change must be generally involuntary.

b. The physiological change being measured must be a common concommitant to psychological stress.

c. The degree of change must be significantly proportional to the degree of psychological stress causing the change.

d. The change must be recordable under the controlled test situation known as a "lie detection" examination.

e. The change must be sufficiently temporary in duration as to allow a return to the situational norm within practical time limits.

It was decided to test the validity of this new instrument in the exact situation in which this writer had been using the polygraph, i.e., on the suspects who were presented to this examiner for detection of deception examinations during the normal course of criminal investigations. A PSE was obtained, and this writer obtained instruction in its chart interpretation.

The aim of this study, therefore, was to investigate the validity of the Dektor PSE in the law enforcement utilization of a stress measuring device which needs to measure an involuntary physiological response directly related to the degree of psychological stress induced in the subject by the varying degrees of stimulus provided by the questions contained in a properly constructed "lie detection" examination. It was further desired to compare the

validity of the Dektor instrumentation with that of a polygraph used in the self-same situation, so that all other components of the "lie detection" system would remain constant, leaving the instrumentation as the only variable.

The hypothesis tested, therefore, was that the voice stress reactions indicated by Dektor PSE would correlate to the degree of stress contained in answers to questions regarding a real crime in which the subject was a suspect. The test of the validity of both forms of instrumentation would be a comparison with the true facts of the situation as might be corroborated by the other investigative techniques which would normally be applied to each case.

Study Method

Subjects

The subjects used for the study were forty-three criminal suspects and rape victims routinely presented to this examiner for polygraph examinations pertinent to the investigation of crimes by the Police Department of Howard County, Maryland. The crime in which their involvement was suspect included shoplifting, larceny, armed robbery, forgery, rape, rape/murder, homicide, arson, possession of narcotics, and incest. Some were examined when first apprehended, others had been incarcerated pending trial for periods varying from one day to four months. Two subjects had received sentencing and had already begun their term of incarceration. Some (4) had requested a polygraph examination in hope of being cleared of suspicion; others had been requested by various investigators to take the polygraph examination.

Their ages ranged from 12 to 51; there were 31 males and 12 females. The subjects were tested in the order and at the time presented.

Procedure

Each subject was personally interviewed by this examiner, who had been provided the background facts of each crime. The subject was given an explanation of two types of instrumentation and the general nature of the "lie detection" examination, after which he executed the appropriate waiver forms and made a written, signed statement that he was taking the test voluntarily. The remainder of the interview, through the end of the actual instrumented examination, was tape recorded. The examiner then interviewed the subject regarding the reason for his being tested, establishing communication between the examiner and the subject, allowing the subject the opportunity

to discuss the incident from his own point of view and in his own language.

From this pre-test interview, the examiner formulated the questions to be used in the structured test comprising the "lie detection examination". The number of questions ranged from 9 to 16, with the number of relevant questions (related to the crime under investigation) ranging from 4 to 11, depending upon the complexity of the suspected involvement or the circumstances surrounding the crime. Each test included "control questions", designed to elicite for purposes of comparison, a stressed reaction to a known lie, and a number of non-stressed reactions to irrelevant or neutral questions.

The list of questions formulated was reviewed with each subject to assure that he understood each question, that no question would come as a surprise, and that he would not be worried about being asked some question he would be unwilling to answer. An attempt was made to formulate the questions in words which each subject felt comfortable with.

When the subject indicated his satisfaction with the test questions, and his willingness to begin the test, the polygraph sensors were attached and the questions read aloud by the examiner and responded to by the subject, in Yes/No replies. Each polygraph response was numbered according to the number of the question asked and annotated (-) to indicate a negative reply or (+) to indicate a positive reply. The examination was administered three consecutive times, as is customary with polygraph instrumentation. When the questioning was completed, the sensors were detached from the subject and the tape recorder turned off. The taped answers to the test questions were processed through the Dektor PSE and the charts produced by the two instruments were laid out for discussion during the post-test interview. Any stress reactions occurring in the PSE charts were easily seen by the subject, and in some cases discussion of these charts was conducive to an admission. In other cases, other causes of stressed reaction were postulated and either confirmed or repudiated with a second examination arrived at through the same procedure as was the first examination. From the time of establishing the need of a second examination, the tape recorder was again turned on to record the pre-test, the review of the second examination, and the administration of the second examination.

RESULTS

The tape recording of the examination was processed through the PSE to produce a set of charts, one chart for each reply. The PSE charts were examined to ascertain the usefulness of this type of instrumentation in the law enforcement situation. Each of the PSE charts was found to contain the five criteria mentioned above as being necessary for a stress-measuring device to be usable in a lie-detection application.

The charted stress indicators, as displayed by the PSE processing of the tape recorded voice of each subject, were contained in all charts of answers to the controlled lie questions. Conversely, indications of non-stress or very limited stress were present in the irrelevant controls.

Any assumed attempt at voice control on the part of the subjects attempting deception was unsuccessful, leading to the inference that these changes had been involuntary. The stress indicators present in the deceitful relevant questions disappeared in the succeeding irrelevant controls, showing a hold-over-time which did not exceed that of the polygraph, and which subsequent tests made without the polygraph have shown to be of shorter duration than the polygraph. The voice stress indications were of course recordable under the controlled testing situation involved in lie detection.

It was concluded, thus, by this writer, upon examination of these criteria, that the PSE instrumentation was indeed adaptable to the law enforcement "lie detection" situational requirements.

Moreover, PSE instrumentation offers the opportunity, because the charts are reproducible upon replay of the tape recording, to duplicate the charts or to produce charts in a number of other modes of the PSE for more detailed examination if desired. The tape recordings also offer a complete record of the full interview and direct evidence which correlates the question content with the corresponding chart of the answer to that question.

Reliability of chart interpretation was investigated by presenting to a second examiner the charts obtained for each subject, without revealing the conclusions of the writer or any results of investigation. PSE charts were available for all 43 subjects examined, while 42 polygraph charts were available, as one subject's doctor, for medical reasons, had withheld permission for the polygraph examination while allowing the PSE examination to be given alone.

The second examiner concurred with the writer's conclusions on all 43 PSE charts, demonstrating a 100% reliability in PSE chart interpretation for this study. This compares with 93% reliability in polygraph chart interpretations, as there were three examples of non-concurrence between the examiners regarding the polygraph charts.

The evaluation of the validity of the conclusions reached from these "lie detection" examinations was a comparison between those conclusions and the results of other investigative techniques.

Of the 43 subjects tested, the polygraph charts of 4 were considered to be inconclusive by reason of the subject's untestability or by reason of the fact that the follow-up second examination, which would have been administered had the polygraph been used alone, was not administered. One of these was concluded through the PSE chart to be cleared, and the other 3, not cleared.

Of the 27 subjects cleared of suspicion through the PSE charts, the innocence of 21 was corroborated by independent investigation; the remaining 6 cleared subjects were released on the basis of no evidence to the contrary. The one cleared subject whose polygraph chart was inconclusive was among the 21 cleared by independent corroborative investigation.

Of the 16 subjects not cleared by the PSE, guilt of all 16 was corroborated as follows:

9 by investigation, with subsequent admission of guilt

3 by investigation without admission of guilt

4 by admission of guilt and subsequent investigation

The 3 remaining inconclusive polygraph examinations were distributed one per sub-group.

"Lie detection" as a system, continues to have four variable components as mentioned earlier, but in this study of parallel instrumentation the variability of the other three components was kept constant and identical, thus allowing the comparison of the only variable, the stress instrumentation, two types of which were used sumultaneously as the fourth component of the system.

This study's findings of 100% correlation between the results of that four component system and independent corroboration, present a successful validation of the hypothesis tested: that the physiological change in the voice which is detected by the Dektor Psychological Stress Evaluator is a valid indication of the stress interpreted by a law enforcement examiner in the structured type of test designed to detect attempted deception.

It is the conclusion of this report, therefore, that the Dektor PSE is a valid component worthy of inclusion in the lie detection application system, either in tandem with the polygraph or used as a single instrumentation of stress.

ANNEX A: FELONY CASE TESTS

TEST	1	2	3	4	5	6	7	8
ALLEGED CRIME	Larceny	Shoplift	Larceny	Larceny	Larceny	Larceny	Larceny	Arson
TOTAL ELEMENTS	12	16	16	16	13	12	10	12
RELEVANT ELEMENTS	5	9	9	9	6	5	4	5
GUILTY			x	x			x	x
COMPLICITY								
INNOCENT	x	x			x	x		
CORROBORATION	Invest.	Invest.	Invest/Conf.	Invest.	None	Invest.	Invest/Conf.	Invest/Conf.
SEX - AGE	M-19	M-22	M-22	M-18	M-20	F-40	M-20	M-23

TEST	9	10	11	12	13	14	15
ALLEGED CRIME	Arson	Rape Victim	Homicide	Forgery	Larceny	Arm. Rob.	Larceny
TOTAL ELEMENTS	11	16	15	12	11	12	12
RELEVANT ELEMENTS	4	10	11	6	5	5	4
GUILTY	x				x	x	
COMPLICITY							
INNOCENT		x	x	x			x
CORROBORATION	Invest/Conf.	Invest.	Invest.	Invest.	Confes.	Confes.	Confes. of Prin..
SEX - AGE	M-19	F-22	M-16	M-45	M-20	M-17	M-18

TEST	16	17	18	19	20	21	22	23
ALLEGED CRIME	Larceny	Rape Victim	Forgery	Drugs	Larceny	Larceny	Rape/Mur.	Larceny
TOTOL ELEMENTS	10	22	10	11	10	9	16	10
RELEVANT ELEMENTS	5	12	4	5	4	4	8	4
GUILTY	x		x					
COMPLICITY					x			
INNOCENT		x		x		x	x	x
CORROBORATION	Confes.	None	Confes.*	Confes. of Prin.	Invest.	Invest.	Invest.	Invest.
SEX - AGE	M-15	F-20	F-36	M-21	M-23	M-26	M-39	M-27

*Subject was untestable on Polygraph.

TEST	24	25	26	27	28	29
ALLEGED CRIME	Arm. Rob.	Incest Vic.	Incest Victim	Arm. Rob.	Indecent Lib.	Mal. Burn.
TOTAL ELEMENTS	12	16	16	14	16	15
RELEVANT ELEMENTS	5	7	7	9	9	9
GUILTY					x	x
COMPLICITY						
INNOCENT	x	x	x	x		
CORROBORATION	Invest/Conf.	Invest.	Invest.	None	Invest/Conf.	Invest/ Confes.
SEX - AGE	M-23	M-16	F-14	F-32	M-51	F-12

TEST	30	31	32	33	34	35	36
ALLEGED CRIME	Mal. Burn.	Rape	Child Mol.	Shoplifting	Shoplifting	Grand Larceny	Alst/Mur/Burg.
TOTAL ELEMENTS	16	15	15	15	10	10	16
RELEVANT ELEMENTS	9	9	9	7	4	6	7
GUILTY	x			x	x		
COMPLICITY							
INNOCENT		x	x			x	x
CORROBORATION	Invest/Conf.*	None	Invest.	Invest/Conf.	Invest/Confes.	None	None
SEX - AGE	M-16	F-22	M-18	M-22	M-20	M-49	M-26

TEST	37	38	39	40	41	42
ALLEGED CRIME	Att. B & E	Grand Larceny	Grand Larceny	Grand Larceny	Grand Larceny	Grand Larceny
TOTAL ELEMENTS	15	15	15	15	15	15
RELEVANT ELEMENTS	8	7	8	8	8	8
GUILTY	x					
COMPLICITY						
INNOCENT		x	x	x	x	x
CORROBORATION	Invest.	Invest.	Invest.	Invest.	Invest.	Invest.
SEX - AGE	M-24	F-19	M-35	F-21	F-20	M-18

*Subject was untestable on Polygraph.

TEST	43
ALLEGED CRIME	Grand Larceny
TOTAL ELEMENTS	15
RELEVANT ELEMENTS	8
GUILTY	
COMPLICITY	
INNOCENT	x
CORROBORATION	Invest.
SEX - AGE	F-22

Total of 162 relevants in 26 cases.
Total of 133 relevants in 17 cases.
Total of 295 relevants in 43 cases.

There were 31 males and 12 females tested.
The ages ranged from 12-51.

Cleared - 27
Not Cleared - 16

ANNEX-B

	NOT CLEARED	INVESTIGATION	ADMISSION	CLEARED	INVESTIGATION	NO EVIDENCE TO CONTRARY		NOT CLEARED	INVESTIGATION	ADMISSION	CLEARED	INVESTIGATION	NO EVIDENCE TO CONTRARY
1.				X	X		25.				X	X	
2.				X	X		26.				X	X	
3.	X	X	X				27.				X		X
4.	X	X					28.	X	X	X			
5.				X		X	29.	X	X	X			
6.				X	X		30.	X	X	X			
7.	X	X	X				31.				X		X
8.	X	X	X				32.				X	X	
9.	X	X	X				33.	X	X	X			
10.				X	X		34.	X	X	X			
11.				X	X		35.				X		X
12.				X	X		36.				X		X
13.	X		X				37.	X	X				
14.	X		X				38.				X	X	
15.				X	X		39.				X	X	
16.	X		X				40.				X	X	
17.				X		X	41.				X	X	
18.	X		X				42.				X	X	
19.				X	X		43.				X	X	
20.	X	X											
21.				X	X								
22.				X	X								
23.				X	X								
24.				X	X								

16 not cleared by PSE
9 corroborated by investigation & admission
3 corroborated by investigation; no admission
4 by admission & later investigation

27 cleared by PSE
21 corroborated by investigation
6 released, no evidence to contrary

STUDY OF THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

Compiled By Anthony E. Dahm of
Dektor Counterintelligence and Security, Inc.

On May 20, 1974 Dektor Counterintelligence and Security, Inc., sent via Western Union Mailgram a questionaire to 153 users of the Psychological Stress Evaluator. A mailing to another 270 users was accomplished on May 23, 1974. As of June 1, 1974 replies from 46 examiners have been received by Dektor.

The respondents, for the most part, gave complete and detailed data, but because of the short time involved, the unexpectedness of some of the questions, and the fact that the examinations have been conducted over a considerable period of time, it was not possible to be provided some of the information requested.

As a means of achieving relevant information, we have classified the replies according to the respondents category of Psychological Stress Evaluator use. There are four categories of users, as follow:

1. Firms Conducting PSE Services: The users who market their capabilities in the field of investigation, their major customer being private industry.

2. Law Enforcement Agencies: Police Departments and other departments of public safety.

3. Retail/Industrial Firms: Firms which make use of the PSE system in pre-employment testing and loss-prevention programs.

4. Clinics/Researchers: The PSE instrument in this field is used for clinical diagnosis or research.

Replies received in response to the questionaire came from firms and individuals in each of these categories. The responses received were as follows:

CATEGORY	No. of replies	% of total replies
Firms Conducting PSE Services	23	50%
Law Enforcement Agencies	8	18%
Retail/Industrial Firms	13	28%
Clinics/Researchers	2	4%

(The proportion of replies from each category approximates that of the purchases of the PSE system over the last 18 month period.)

QUESTION 1: Number of cases conducted.

The total number of cases reported: 39,329.

Number of cases reported according to the category of the user:

Firms conducting PSE Services	24,645	62.6%
Law Enforcement Agencies	4,027	10.3%
Retail/Industrial Firms	10,507	26.7%
Clinics/Researchers	150	0.4%

QUESTION 2: Types of cases conducted.

Types of examinations:

Pre-employment testing -- used for verification of data submitted on employment applications.

Periodic Screening -- Tests conducted as checks on employee honesty.

Specific Issues -- Tests Pertinent to the investigation of a specific problem; e. g., inventory shortage, missing funds.

Criminal Investigations -- Examinations conducted in regard to a known crime, committed or alleged.

Types of cases reported by firms doing PSE Services:

Pre-employment testing	4,605
Periodic Screening	193
Specific Issues	1,320
Criminal Investigations	290
Not Specified	18,237

Types of cases reported by Law Enforcement Agencies:

Criminal Investigations	1,527
Not Specified	2,500

Types of cases reported by Retail/Industrial Firms:

Pre-employment testing	4,502
Specific Issues	783
Not Specified	5,222

Types of cases reported by Clinics/Researchers:

Diagnostic & therapeutic testing	150

QUESTION 3: Tests conducted with Polygraph and PSE simultaneously.

Of the 46 respondents, 15 examiners indicated that, for research reasons, they had conducted simultaneous examinations with the Polygraph and the PSE. One examiner continued simultaneous examinations because of state law. The total number of simultaneous examinations reported is 5,579. Of these respondents, 5 did not indicate degree of correlation between the two instruments. The remaining 10 accounted for 5,045 examinations. Of these, the two instruments resulted in the same findings in 5,037 cases for 99.84% correlation.

QUESTION 4: Percentage of examination findings confirmed.

A problem concerning this question arose. The PSE examiner, like any investigator, accepts a case as confirmed only when the data achieved from an examination is corroborated by admission and/or conclusive outside evidence. Some of the examinations never reach this point. An examinee who is cleared because the examination shows no stress in relevant areas, does not necessarily become the subject of further investigation. A good example is pre-employment testing. An examination that shows no stress in relevant areas would not, of itself, cause the investigator to verify the examination with further investigative work.

When this problem was recognized, an attempt was made to contact the respondents by telephone to inquire if any PSE examination had been proven wrong by information acquired after the examination was conducted. Dektor was able to contact 19 respondents, who were asked the number of cases in which the findings of a PSE examination were contradicted by independent investigation. Of the 10,202 examinations conducted by these 19 individuals, they reported not one case in which the findings of the PSE examination had been inaccurate. Additionally, on the positive side, 2,285 examinations, or over 20% of those reported, were corroborated independently.

QUESTION 5: How confirmed.

As stated above, the method cited in every case was by means of admission and/or independent investigation.

QUESTION 6: Dollar savings to your firm.

80% of the respondents stated that there is no means by which they are able to determine the dollar amount saved. Nine respondents stated savings in terms of recovered funds and/or goods in excess of $180,000.00.

Other respondents estimated savings by his clients through recovery and deterrence of between $150,000 and $250,000.

Another respondent estimated that his clients, have averaged a 20% increase in registered sales; a 33% decrease in inventory shrinkage; a 40% decline in temporary employee turnover; and a 60% decline in permanent employee turnover since incorporating PSE examinations.

QUESTION 7: Number of persons cleared of suspicion.

Of the 46 respondents, 19 provided sufficient data to allow determination of percentages of persons cleared in criminal and specific issue cases. This evaluation involves 3,286 examinations of the total of 3,920 criminal and specific issue examinations reported. The results are as follow:

Firms doing PSE Services:			
Criminal	93 exams	45 cleared	48.4%
Specific Issue	1,235 exams	1,010 cleared	81.8%
Law Enforcement Agencies:			
Criminal	1,472 exams	863 cleared	58.6%
Retail/Industrial Firms:			
Specific Issues	486 exams	346 cleared	71.2%

Of the total of 3,286 examinations so reported, the examinee was cleared in 2,264 cases for a total clearance percentage of 68.9&.

QUESTION 8: Number of convictions obtained.

Firms doing PSE Services: 41 convictions. The majority of the respondents in this area stated that, after presenting to their clients the results of the examinations, they had no further knowledge regarding the disposition of the cases.

Law Enforcement Agencies: 17 convictions. There are several additional cases now pending court action.

Retail/Industrial Firms: 11 convictions. Most respondents in this category indicate that the company policy is to insist upon restitution from the parties involved, rather than prosecute.

QUESTION 9: Waiver Form and Informed Rights.

All respondents indicated that in all cases a waiver form was signed and rights were read to an examinee when applicable. Most firms include the reading of the waiver and the explanation of rights as part of the taped interview.

QUESTION 10: Comments.

A large number of respondents reported examinee's preference for the relaxed and dignified conditions of the PSE examination, as compared to those of a Polygraph examination. Comments included the relief of an individual when he has a means of verifying that he is telling the truth about the facts on his employment application or about his suspected involvement in an inventory theft, or other crimes being investigated. Also cited is the fact that a store manager is assured that the person who is placed in his stores is the type of person that is portrayed by his employment application.

STUDY CONCERNING THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

TABLE 1
AREA OF USE BY RESPONDENT

REPLY #	PSE SERVICES	LAW ENFORCEMENT	INTERNAL USER	MEDICAL
1		X		
2		X		
3	X			
4	X			
5			X	
6	X			
7	X			
8	X			
9	X			
10	X			
11	X			
12			X	
13			X	
14		X		
15			X	
16		X		
17			X	
18	X			
19		X		
20			X	
21			X	
22		X		
23				X
24			X	
25	X			
26	X			
27		X		
28			X	
29	X			
30	X			
31				X
32	X			
33	X			
34	X			
35	X			
36		X		
37	X			
38	X			
39			X	
40			X	
41	X			
42			X	
43	X			
44			X	
45	X			
46	X			
TOTALS	23	8	13	2

STUDY CONCERNING THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

TABLE 2A

TOTAL NUMBER AND TYPES OF EXAMINATIONS BY FIRMS DOING SERVICES

REPLY #	EXAMINATIONS	Pre-Employment	Periodic Screening	Criminal	Specific Issues
1					
2					
3	2,000	*	*	*	*
4	1,500	*	*	*	*
5					
6	41			41	
7	490	460		24	6
8	500	*	*		
9	281	*	*	*	*
10	1,100	*	*	*	*
11	149	*			*
12					
13					
14					
15					
16					
17					
18	599	385	135		79
19					
20					
21					
22					
23					
24					
25	171		*	*	
26	300	*	*	*	
27					
28					
29	500	500			
30	147	*	29	28	*
31					
32	66		29	2	35
33	155	150		5	
34	250	*	*	*	*
35	700	*		*	
36					
37	96	*	*	*	*
38	3,800	3,610		190	
39					
40					
41	4,000	*	*	*	400
42					
43	3,600	*	*		*
44					
45	3,200	*	*		800
46	1,000			*	*
TOTALS	24,645	4,605	193	290	1,320

* Examinations conducted in these areas but exact number not provided

STUDY CONCERNING THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

TABLE 2B

TOTAL NUMBER AND TYPES OF EXAMINATIONS BY LAW ENFORCEMENT AGENCIES

REPLY #	EXAMINATIONS	Criminal
1	20	20
2	18	18
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14	35	35
15		
16	642	642
17		
18		
19	622	622
20		
21		
22	55	55
23	25	25
24		
25		
26		
27	2,500	*
28		
29		
30		
31		
32		
33		
34		
35		
36	110	110
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
TOTALS	4,027	1,527

* Examinations were conducted in all areas

STUDY CONCERNING THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

TABLE 2C
TOTAL NUMBER AND TYPES OF EXAMINATIONS BY INTERNAL USERS

REPLY #	EXAMINATIONS	Pre-Employment	Periodic Screening	Specific Issues
1				
2				
3				
4				
5	205			205
6				
7				
8	500	*	*	
9				
10				
11				
12	57	13		44
13	187	*		*
14				
15	276	179		97
16				
17	97	40		57
18				
19				
20	250	*		*
21	3,000	*	*	*
22				
23				
24	46			46
25				
26				
27				
28	515	403		112
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39	535	*	*	*
40	4,000	3,800		200
41				
42	89	67		22
43				
44	750	*	*	*
45				
46				
TOTALS	10,507	4,502		783

* Examinations conducted in these areas but exact number not provided

STUDY CONCERNING THE FIELD USE OF PSYCHOLOGICAL STRESS EVALUATOR

TABLE 3

CASES RUN SIMULTANEOUSLY ON THE POLYGRAPH AND THE PSE

REPLY #	NUMBER OF SIMUL. EXAMINATIONS	TIMES PSE AND POLYGRAPH AGREED
1		
22		
3		
4		
5		
6		
7		
8	100	100
9		
10	22*	
11	2	2
12		
13		
14		
15		
16	1	1
17	2*	
18	60*	
19		
20	50*	
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33	5	5
34		
35		
36		
37	2	2
38		
39	188	180
40	47	47
41	400*	
42		
43	3,600	3,600
44		
45	100	100
46	1,000	1,000
TOTALS	5,045	5,037

* Number of examinations which were conducted simultaneously but no information provided concerning number of times the two instruments were in agreement. (Number is not included in total)

STUDY CONCERNING THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

TABLE 4

NUMBER OF CONFIRMED EXAMINATIONS
CONFIRMED BY ADMISSION AND/OR FURTHER INVESTIGATION

REPLY #	PSE SERVICES	LAW ENFORCEMENT	INTERNAL USERS
1		8	
2			
3	1,100		
4	1,440		
5			182
6	20		
7			
8			
9	224		
10	880		
11	30		
12			
13			149
14		21	
15			271
16		256	
17			97
18	407		
19			
20			237
21			
22			
23		25	
24			9
25	103		
26	5		
27			
28			438
29	200		
30	74		
31			
32	66		
33	140		
34	225		
35			
36		72	
37	96		
38	570		
39			61
40			160
41	200		
42			5
43			
44			188
45	50		
46	850		
TOTAL	6,680	382	1,797

STUDY CONCERNING THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

TABLE 5

NUMBER OF PERSONS CLEARED OF SUSPICION

REPLY #	PSE SERVICES Criminal	PSE SERVICES Spec. Issues	LAW ENFORCEMENT Criminal	INTERNAL Spec. Issues
1			5	
2			16	
3				
4				
5				175
6	22			
7	5			
8				
9	23			
10				
11				
12				40
13				57
14			23	
15				261
16			320	
17				33
18				
19			435	
20				35
21				35
22				
23			7	
24				32
25				
26				
27				
28				63
29				
30	18	20		
31				
32		30		
33				
34		220		
35	50			
36			57	
37		68		
38				
39				119
40				
41		260		
42				3
43				
44				
45		720		
46		900		
TOTALS	118	2,218	863	853

STUDY CONCERNING THE FIELD USE OF THE PSYCHOLOGICAL STRESS EVALUATOR

TABLE 6

NUMBER OF CONVICTIONS OBTAINED

REPLY #	PSE SERVICES	LAW ENFORCEMENT	INTERNAL USERS
1		3	
2			
3	13		
4			
5			1
6			
7			
8			
9			
10			
11			
12			
13			
14		4	
15			
16		7	
17			
18			
19		3	
20			
21			10
22			
23	18		
24			
25			
26			
27			
28			
29			
30	1		
31			
32			
33			
34			
35			
36			
37			
38	2		
39			
40			
41			
42			
43			
44			
45			
46	7		
TOTALS	41	17	11

ANALYSIS OF THE VOICE

A Study

by

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1973

The study investigated a new technique by which stress is detected by the electronic analysis of tape recordings of a speaker. Patients read out phrases referring to common life-stressors and also stressors peculiar to the individual patient. The anxiety caused to the patient by these stressors was assessed from the electronic analysis of his voice, and there was evidence that this could be done with an adequate degree of reliability. There was evidence also of some degree of validity, as the voice evaluations in general corresponded significantly with the patients' self-reports about their anxieties. Moreover, this correspondence was low only for people with high Lie scores on the Eysenck Personality Inventory, people whose self-reports might be expected to have least validity. It is suggested that psychological methods of treatment might be made more efficient by using this technique to more accurately identify areas of anxiety.

There are a number of studies in the literature demonstrating that stress produces changes in the voice. Many of these changes are audible and to some extent recognizably emotional, and there is natural interest in objectively recording even these audible voice changes. Even more intriguing, however, is the discovery of voice changes which are quite inaudible and yet measurable (Rubenstein 1966). A practical application of this is in the lie-detection situation, where the subject may show no audible voice changes at all (Alpert et al, 1963; Friedhoff et al, 1962).

One of the technical problems concerns which of the physical characterization of the voice is most sensitive to stress. Rubenstein (1966) measured vocal intensity and fundamental vocal frequency and found that these were affected by stress to a degree which was too minute to be audible but was detectable electronically. However, it is doubtful whether his procedure could be carried out in other than laboratory conditions, with a soundproof room and strict preservation of the distance between subject and microphone.

Fortunately, there is now available some equipment which seems to solve many of these problems. Called the Psychological Stress Evaluator (PSE), it exploits the inaudible frequency modulations superimposed on the audible voice frequencies. According to the manufacturer "these involuntary frequency modulations are understood to result from minute oscillations of the muscles of the voice mechanism. Such oscillations, known as physiological tremor or micro-tremor, can be shown in the laboratory as a normal accompaniment to the activity of any voluntary muscle, occurring at the rate of 8 - 14 cycles per second. The strength and pattern of the inaudible frequency modulations relate inversely to the degree of stress in the speaker at the moment of the utterance. Whereas most of the functional indicators of stress are attributed to the Autonomic Nervous System, micro-tremor as seen in the voice mechanism appears to be controlled by the Central Nervous System; as the ANS gains dominance in a stress situation, the micro-tremors are suppressed. In contrast to the hold-over of the ANS indicators, recovery of the micro-tremors and frequency modulations upon removal of the stressing stimulus allows evaluation of closely spaced stimuli, as may occur in narrative speech.

"A tape recording preserves the speech pattern containing the voluntarily formed words which carry the involuntary speech components indicating stress. Using electronic filtering and frequency discrimination techniques, the PSE processes the voice frequencies and displays the inaudible, stress-related FM patterns on a moving strip chart. These FM patterns, as interpreted by Chart Interpretation Criteria, indicate the levels of psychological stress".

The aim of the present study was to investigate the diagnostic claims made for this equipment, which at the moment is fairly new and has had very little systematic work done on it, although it is beginning to be fairly extensively applied, particularly as a lie detector in the criminal field. The particular hypothesis to be tested was that the voice stress shown by a patient who reads out phrases referring to areas of his life which might worry him would correspond with the actual stress caused to him by each of these areas of his life. In testing this hypothesis there is of course the problem of verifying which are the actual stressors. It was decided to use the most convenient validity criterion available, i.e., the patient's self-report. Although this might often be inaccurate, it ought to have sufficient validity to allow the hypothesis to be tested.

In addition there was interest in whether patients would differ in the degree of agreement they showed between their self-reports and and their indications of stress on the PSE, and whether this variation would relate to personality characteristics of the patient. Other studies have shown systematic personality differences between physiological measures of anxiety and subjects' self-reports. For example, Lazarus and Alpert (1964) found that "repressors" denied anxiety but showed it autonomically, whereas "sensitisers" (as judged by a personality questionnaire) claimed anxiety which they did not show autonomically.

The particular interest of the author was on the Lie scale of the Eysenck Personality Inventory. This scale was originally introduced into the EPI to detect subjects who fake their responses, but other interpretations have been suggested for the Lie score (Eysenck et al, 1971). High Lie score subjects could be answering honestly but inaccurately, showing a lack of insight into their own behaviour. Alternatively, they could be answering reasonably accurately, in which case they could be

described as having a high need for social approval. The author's hypothesis was that the Lie score does in fact indicate inaccuracy of responding (which would however not rule out the possibility that high Lie score people do have a high need for social approval and hence are motivated to give or have inaccurate views of their behaviour). The hypothesis tested was that high Lie score patients would show greater discrepancies between self-reported stress and stress indicated by the PSE, and specifically that they would show more stress on the PSE than claimed in their self-reports.

METHOD

Subjects

The subjects were 15 patients, comprising all those patients who attended at the author's office for therapy during a two week period. They were originally referred from psychiatric out-patient clinics because of symptoms of neurotic anxiety. Nine of them suffered from general anxiety states, often with agoraphobia and social phobias. The others were: a habitual nail biter, a stammerer, an obsessional ruminator, a woman with an eye-blinking tic, a wasp phobic, and a woman with severe frigidity. They were being treated by the author with various combinations of behaviour therapy and client-centred psychotherapy, and many were also on minor tranquilizers. During the period when the experimental measurements were carried out the patients were at various stages of their treatment, from just beginning, to near ending.

There were six males and nine females, with ages ranging from 19 to 65, the average age being 32. All were of average IQ or above. The Eysenck Personality Inventory was administered in a special form, comprising the 24 Neuroticism items of Form B, the 24 Extraversion items of Form B, and, as there was a special interest in the Lie scale, the full 18 Lie items of Forms A and B. Characteristics of the sample were: N, mean = 16, S.D. = 5; E, mean= 12, S.D. = 3.5; L, mean = 4.7, S.D. = 2.5.

Although the sample size is smaller than is often used in experimental studies, it was though appropriate that this should be so, as the aim of the study was to investigate the characteristics of a technique

intended to be used on individual patients.

Procedure

A pool of phrases was drawn up, referring to common life-stressors, eg, money, sex, family relationships, job, and fatal diseases. For a particular patient, some of these stressors were irrelevant (eg, not married); therefore seven of the relevant ones were selected, and to them were added three phrases referring to the particular problems of the patient. The ten phrases were put in random order, and a neutral phrase, "summer and winter", was added at the beginning for the purpose of absorbing any initial stress caused by beginning to speak. This phrase was not analysed later. Fig. 1 shows an example of such a list.

0. Summer and winter
1. Losing my job
2. Stammering
3. Losing my wife
4. Talking to people
5. Money problems
6. Having cancer
7. Things at work
8. Making a phone call
9. Having a heart attack
10. Losing my children

Fig. 1. An example of a list of phrases drawn up for a particular patient (a stammerer).

The patient's list was printed on a sheet of paper, which was handed to him with the request that he read out the phrases. It was explained to him that a tape recording would be made and that the PSE would analyse his voice to measure how much he was worried about each of hte topics. The microphone was hung on a cord round the patient's neck in order to ensure an adequate recording level in what were fairly noisy surroundings. In making the recording, the patient read through the list in the order given, cued on each phrase by the experimenter saying its number. For the purpose of obtaining an estimate of immediate retest reliability, the patient read out the list twice, each time in the same order. After completion of the tape recording, the patient

was asked to report which of the topics had worried him at least a fair bit recently, and his reply was noted in simple YES or NO form.

Each patient's tape recording was then processed through the PSE to obtain charts of the voice frequencies, in Mode III and also in Mode IV (the Modes refer to degrees of filtering: Mode IV gives the most detailed chart). Hence for each phrase there were four charts: test and retest each in Mode III and Mode IV. Each patient's 40 charts were invisibly labelled and then shuffled before analysing. This was done to minimise experimenter bias, as the author by then knew what the patient had said worried him. Unfortunately, no independent rater was available to analyse the charts. However, the author was only very rarely able to recognise the chart he was scoring.

Chart Scoring Procedure

The manufacturers of the PSE provide Chart Interpretation Criteria, but unfortunately most of these patterns (eg, Square Blocks, Diagonal Blocks, and Cyclic Rate Changes) do not often appear in conditions of mild stress such as in reading out phrases. The main stress pattern which was observed was the High Leading Edge, and occasionally a Tendency to Square (Moderate stress). These are defined below. Although high levels of stress can be rated fairly simply as 100%, 75%, and 50%, lower levels are less easy to evaluate. Before the study could be done, therefore, work had to be done on other patients to devise a scoring system which looked as if it would be reliable and valid.

What emerged were strict minimal definition of the two common stress patterns:

(1) A High Straight Leading Edge (coded: E)

This was defined as a leading edge to a waveform, starting at the base of the chart and rising higher than the centre of mass of any of the following waveform. The only inperfection allowed in the leading edge would be only one subsidiary cycle, as long as it did not overlap with the rest of the waveform.

(2) A Tendency to Square (coded: T)

This was defined as a waveform with a continuous centre of mass extending without change of curvature for a space of at least 12 cycles. The wavelength of the frequency modulations in unstressed speech normally covers about 10 - 12 cycles of the PSE voice pattern, and therefore if about 12 cycles of the pattern exist without change of curvature, this indicates definite suppression of the FM.

It must be noted that although these definitions are very similar to those provided by the manufacturers of the PSE, the additions made by the author are purely arbitrary and no doubt will need some modification in future.

The stress on each chart was scored simply by counting the number of High Straight Leading Edges (E's) and Tendencies to Square (T's). For example, if there was one E and one T on a chart, the score was 2. The maximum stress score observed on a single chart was 3. Evaluating the stress on a single phrase by totalling the scores on its four charts (test and retest each in Mode III and Mode IV) gave a range of scores from 0 to 8.

From this work preliminary to the actual study (using other subjects), it appeared that a stress score of one or more on a single chart, or a total score of 2 or more on two charts, or a total score of 3 or more on the four charts of a single phrase would correspond to a self-report of at least moderate anxiety, and these norms were used in the analysis of the following results. Further details of chart scoring can be obtained on application to the author.

RESULTS

Immediate Retest Reliability

This was calculated for Mode III charts and Mode IV charts separately, and then for a combination of Modes III and IV charts. Charts had been printed in both Modes as it was anticipated that analysis of single charts would be somewhat unreliable.

A reliability statistic was calculated for the Mode III charts as

follows. For each patient the phrases which showed stress (score 1 or more) on first reading were separated from the phrases which showed no stress (score 0). Then the percentage of phrases stressed on the first reading which still showed stress on the second reading was calculated, as well as the percentage of the non-stress phrases which showed stress on the second reading. The null hypothesis was that the difference between the first percentage and the second percentage would be zero, and the test hypothesis was that the difference would be greater than zero, over the 15 patients.

The reliability of the Mode IV charts was calculated in the same way. The reliability of Modes III and IV combined was calculated by comparing the sum of the Mode III stress score and the Mode IV stress score on the first reading, with the corresponding sum on the second reading, in the same way as described above. For Modes III + IV, the stress phrases had been defined as those with stress scores of 2 or more. Table 1 shows the results. It would seem that a reasonable level of reliability could be obtained only with a sum of Modes III and IV scores. Further analysis was done therefore only with such a sum.

Table 1. Immediate retest reliability (15 subjects)

Mode	Mean difference between percentages	Standard error of the mean	t	Significance level
III	+12.2	10.0	1.23	87.5 %
IV	+21.7	10.8	2.1	97.0 %
III+IV	+33.2	8.1	4.1	99.9 %

Validity

In an attempt to increase reliability further, the stress score for each phrase was now considered to be the sum of the stress scores on all four charts of each phrase (test and retest, Modes III and IV). As mentioned previously, this gave a score range of 0 - 8, with stress phrases being defined as those with scores of 3 or more.

A validity statistic was calculated as follows. Each patient had reported YES or NO to the question of whether he was worried about the topic referred to in each phrase. What was calculated now for each patient was the percentage of YES phrases which had turned out to be stress phrases, as well as the percentage of NO phrases which had turned out to be stress phrases. The null hypothesis was that the difference between these percentages would be zero, and the test hypothesis was that the difference would be greater than zero, over the 15 patients. Table 2 shows the results.

Table 2. Correspondence of stress scores with self-reports

Mean difference between percentages	Standard error of mean	t	Significance level
+29.7	8.0	3.7	99.8 %

Correlations with the EPI Lie scale

The mean percentage of each patient's YES phrases which turned out to be stress phrases on the PSE was 61.3, and the correlation of this percentage with the patient's Lie score was not significant (Pearson r = -0.19). On the other hand, the mean percentage of NO phrases which turned out to be stress phrases was 31.7, and the correlation with L was significant at the 98% level (r = +0.62, n = 15). A linear regression equation was calculated: % = -25 + 12L. Hence the percentage inaccuracy on the NO phrases increases from zero at a Lie score of 2, to very high levels at Lie scores of 6 or more.

DISCUSSION

The results support both hypotheses of the study: that the PSE stress indicators on a phrase read out by a patient corresponds in general with whether or not he says he is worried about the topic referred to; and that the degree of this correspondence is low for

patients with high Lie Scale scores, in the sense that they deny being worried about topics which in fact show stress on the PSE.

There is the question of what the PSE is ultimately measuring. It would be exciting to think that this technique could be used to identify a patient's areas of stress more accurately than could be done by relying on his self-report, particularly in high Lie score people (who constitute a third of all the patients referred to the author for therapy), and that treatment could thereby be directed more efficiently at relevant areas. However, it is conceivable that the PSE is merely uncovering peripheral issues. For example, a high Lie score patient may indeed have an emotional reaction to a topic when it is mentioned during the PSE test, and yet this topic may truly not be a source of stress in his life as he may generally be able to avoid this topic outside the test situation. If this were so, then it would still indicate a psychological weakness in the patient, but whether this weakness would be relevant to his state of anxiety is open to question.

This is related, of course, to the wider issue of whether stressful stimuli make people neurotic or whether neurotic people find stimuli stressful, or both. Psychotherapists and behaviour therapists, such as the author, work on the assumption that the first of these premises is true, or at least very important; hence their efforts to modify patients' reactions to fairly specific stimuli. The use of the PSE to perhaps identify these stressful stimuli more accurately would help to determine how far this assumption can be taken. The author is presently engaged in further research to assess the validity of the PSE against the criterion of change in treatment efficiency.

Thanks are due to Dektor CIS GMBH, Hamburg, for the loan of their equipment during the period of this study.

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STAGEFRIGHT AND STEVENS' LAW

A Study

by

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Presented
at
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Abstract

Twenty-four introductory speech students recited a poem before 0, 2, 8, or 22 spectators, and recordings of the performances were analyzed for physiological vocal stress. As predicted, by applying Stevens' Law to social facilitation theory, arousal before a passive audience increased as a power function of audience size.

Stagefright and Stevens' Law

Purpose: The study tests a theoretical relationship between Stevens' Psychophysical Law and social facilitation theory. Stevens' Law holds that psychological intensity grows as a power function of physical intensity for any perceptual scale on which stimuli vary in magnitude. No test of the law has been carried out using people as a magnitude scale. That is, does the psychological effect of a group increase as a power function of group size? Social facilitation theory provides a basis to test this prediction in the case of simple performance effects. Performing before passive spectators increases general arousal level simply because of the perceived presence of others. Applying Stevens' Law, it was predicted that this arousal would increase as a power function of audience size.

Subjects: 13 female and 12 male students from introductory speech classes at the University of Michigan served as subjects in partial completion of their class requirements.

Procedure: The experiment consisted of two sessions. At the first session subjects individually performed a short poem aloud before an empty auditorium. Two days later, at the second session, subjects again performed the poem but this time, before either 22 spectators (6 Ss), 8 spectators (6 Ss), 2 spectators (7 Ss), or no spectators (6 Ss). The spectators were students from introductory psychology who sat passively through the performances. All performances were recorded by means of a hidden microphone. The poem was Part I of Edgar Allan Poe's "The Bells", a short selection which is considered a difficult performance piece..

Results: Analysis of the data was carried out with a Psychological Stress Evaluator. This new instrument monitors recorded samples of speech and graphs certain FM frequencies in the voice pattern which are associated with arousal in the central nervous system. Due to poor tape reproduction of Session I, it was impossible to obtain accurate baseline stress measures. The PSE graphs from Session II, however, yielded 25 to 63 patterns per subject which were analyzed for stress. Each pattern was scored for the degree of square or diagonal blocking present: definite evidence of blocking (score = 1), suggestion of blocking (score = ½) or no suggestion of blocking (score = 0). PSE scores correlated r = .32 with self report of arousal and correlated whether or not subjects recalled the presence of three red stars and a reg margin on the copy of the poem present on the lecturn. This relationship follows from Easterbrook's theory concerning incidental cue utilization and arousal. Self report and Easterbrook score did not themselves correlate (r = .02).

As shown in Figure 1, PSE vocal stress showed the predicted increase with audience size. When compared with the theoretically derived power function, the data formed an almost perfect fit (power function: $X^2_{(2)} = .06$, $p > .05$; linear fit: $X^2_{(2)} = .35$, $p < .10$). The best fitting exponent of .47 falls well in the range of previously discovered psychophysical exponents.

Following the performance, subjects estimated the number of spectators present in the auditorium. Audiences of 0 spectators and 2 spectators were estimated correctly by all subjects, but audiences of 8 spectators and 22 spectators were consistently overestimated (mean estimate = 9.7, 29.2 respectively). These results replicate earlier psychophysical literature on numerosity which holds that up to 7 items people estimate directly ("subitize"); above this number they overestimate. The results also argue that increase in arousal is determined by some discriminable aspect of the group other than simple numerosity. Even with Stevens' Law, the psychological whole is not necessarily the sum of the parts.

Implications: The results supported a social extension of Stevens' power law. This extension promises to have widespread applications as social psychologists come to understand the role of perception within other forms of social influence. Work to this effect is now being carried out in our laboratory.

A secondary finding concerns a methodological issue regarding the success of the PSE measures of arousal. It will be a surprise if this unobtrusive lie detector does not soon become a part of our way of life.

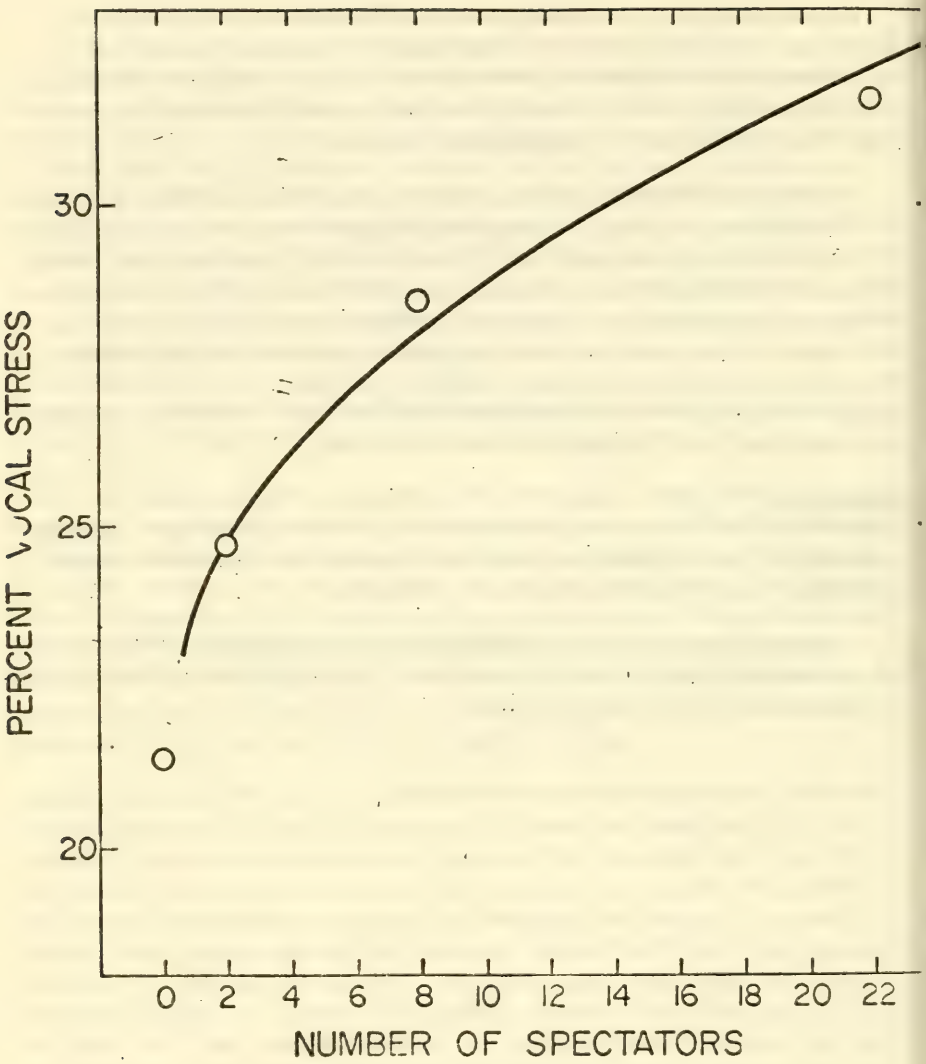

Figure 1: Percent vocal stress as a function of audience size. Solid line represents best fitting power function, $y \propto x^{.47}$.

Use of Voice Changes in the Detection of Deception

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Presented
at
Acoustical Society of America, Los Angeles
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Abstract

Short-term voice changes from subjects in low-stress and high-stress lie-detection situations were visually displayed by a Psychological Stress Evaluator, model PSE-1. Low-stress subjects (n=16) picked one of five numbers, then answered "no" to all questions regarding which number they had picked. High-stress subjects (n=14) were criminal suspects undergoing polygraph examinations in which their verbal answers to the test questions were simultaneously tape recorded for analysis. Under the low-stress condition the detection rate was not significantly different from chance. Under the high-stress condition, using polygraph responses as the criterion for stress, voice changes were clearly able to distinguish between truth and deception. Using a numerical scoring technique with a ± 2 inconclusive range, the voice agreed with the polygraph in eight of 14 cases ($p < 0.01$), with the remaining six inconclusive. When inconclusives were restricted to scores of 0, there were 12 agreements ($p < 0.01$), one disagreement, and one inconclusive. Using ranks to compare the effectiveness of voice changes against the three individual components of the polygraph, it was found that the voice was the second most effective single parameter. It is hypothesized that a certain level of stress must be reached in the individual before changes in the voice occur; but once that level of stress is exceded, differential changes in the voice can be used to determine deceptiveness.

An Early Validation Study With The Psychological Stress Evaluator (PSE)

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An Early Validation Study With The Psychological Stress Evaluator (PSE)

Abstract An attempt was made to establish some validity for a new device called the Psychological Stress Evaluator (PSE), which is manufactured by Dektor, Inc., of Springfield, Virginia. The reliability of the stress analyses was also studied. Twelve subjects were placed in a wagering situation designed to heighten their psychological stress. Money was concealed by the subject in one of four locations and the examiner then bet each subject that he could determine the location of the money by analyzing the subject's voice during a structured questioning period. Two trials were given for each subject. Although the PSE was unsuccessful on the first trial, on the second trial both the examiner and his assistant were independently able to select correctly the location of the money at a level significantly better than chance. Moreover, the inter-rater reliability between the examiner and his assistant was significant. The success of this study suggests that the PSE holds promise of being a valuable research tool, although much more scrutiny is needed to establish the limits of its capabilities.

Introduction

For the past three years a new piece of apparatus measuring psychological stress has been commercially produced by the Dektor company of Springfield, Virginia. This device, called the Psychological Stress Evaluator (PSE), was developed by the company's president, Mr. Alan Bell. It has been gaining increased acceptance by police departments, detective agencies, and other groups involved in the detection of deception because the PSE can be utilized as an attractive alternative to the polygraph. However, a few psychiatrists and psychologists have also been attempting to apply it to the mental health professions.

The Dektor company claims the PSE is able to detect, measure, and graphically display specific stress-related components of the human voice. The company states that "superimposed on the audible voice frequencies are inaudible frequency modulations (FM) whose strength and pattern relate inversely to the degree of psychological stress in the speaker at the moment of utterance." (Dektor, 1972).

The company further states that the physiological basis for these involuntary modulations are believed to be the result of tiny vibrations of the muscles of the voice mechanism. These vibrations, called micro-tremors, occur normally at a rate of 8-14 cycles per second. Dektor claims that the PSE measures a suppression of these micro-tremors which occurs involuntarily under stress. That is, Dektor is saying that other physiological processes over-ride these micro-tremors in a regular, predictable fashion during the vocalization of an individual experiencing psychological stress.

By graphically presenting the incidence of the suppressing effect on the micro-tremors, a precise and accurate indication of the stress can be obtained. The company claims that "stress indiced by fear, anxiety, guilt and conflict facilitates detection of attempted deception during interrogation and aids in a variety of professional decisions based on judgements concerning motivation, honesty, reliability, areas of tension, and 'psychological set'." The apparatus is completely portable, can be carried easily by one person, and is used in conjunction with a Uher 4000 tape recorder. (Dektor, 1972)

Although the company has been able to produce many letters of testimonial from users of the PSE, as well as claiming its own validity testing, the fact is that no systematic validation efforts have been made by an independent researcher of which this author is aware. To my knowledge there are no scholarly papers or scientific journal articles which can support the kinds of broad claims the company has been making. Rather, the general public, as well as the scientific community, must rely primarily on popular magazines and newspapers for information about the PSE (eg. The National Observer, 1972; Penthouse, 1973). Clearly, until the PSE can earn serious consideration from the scientific community a body of research data must be accumulated from scientifically respectable, well-controlled laboratory experiments.

A paper presented by Barland (1973) at the 86th Meeting of the Acoustical Society of America compared PSE analyses of recorded interrogations which had also been conducted using a polygraph. Barland states that under high stress conditions his study clearly shows that "reliable changes occur in the voice which are correlates of short-term psychological stress evidenced by changes in the autonomic nervous system." His subjects were all suspected of major crimes and presumably under very high levels of psychological stress during their interrogation. In the same paper Barland also reported an attempt to measure low to moderate levels of stress which failed.

If the PSE is able to measure psychological stress as it claims - guilt, anxiety, tension, and psychological set - a tool of potentially high value is currently larely unrecognized. However, without the credentials of scientifically established validity and reliability one must remain skeptical. It is the goal of this paper to begin the process of validating this instrument and calling scientific attention to it.

Subjects

The subjects for this experiment were drawn primarily from the cadet student body at the Virginia Military Institute (VMI). Several subjects in addition were drawn from the Lexington, Virginia, community. These included one staff member from Washington and Lee University and 3 female VISTA volunteers living in Lexington. A total of 12 subjects were selected.

All the subjects were white, between the ages of 18 and 28, and from middle-class backgrounds. None of the subjects were suffering from any known physical or mental illness; all were selected at random and voluntarily agreed to take part in the experiment.

Procedure

Each subject was brought into a room containing the PSE, a Uher 1100 tape recorder, and 4 specially prepared ashtrays (in which it was possible to conceal money in the form of both coin and currency) which were placed on four chairs numbered 1 through 4. Accompanying the subject were the examiner and his assistant.

The subject was shown the PSE and explained in brief its function, with emphasis on the PSE's ability to detect involuntary physiological changes. The subject was then invited to participate in a wager with the examiner, wagering being a situation which the examiner in his experience with students has found to be a reliable but non-damaging way of eliciting low to moderate psychological stress.

The terms of the wager were as follows: The examiner would match the subject any sum of money up to $1.00, which the subject would conceal in one of the four ashtrays. The subject would then submit to questioning, which would be tape recorded and then analyzed with the PSE. The subject would not of course verbally reveal which ashtray contained the money. If in his first selection the examiner was able to correctly identify the ashtray containing the money, utilizing only the stress analyzed speech of the subject, then the subject would lose and the examiner would keep the money. If the examiner was able to select correctly the location of the money on his second selection, it would be declared a draw and the money returned to both the examiner and the subject. If however the examiner was not able to make a correct selection on neither the first nor the second attempt, the subject would be declared the winner and he could keep the entire sum of money he had concealed, both his own and the examiner's.

Each subject was invited to participate in this wager twice, thus constituting the two trials. No subject refused to participate in the second. The amount of the wagers varied from $.06 to $1.00, with the average wager being approximately $.50.

While the subject was concealing the money the examiner left the room and the assistant turned his back to the chairs containing the ashtrays. Thus the actual location of the money was completely unknown to all but the subject. Only the examiner's selections were utilized for the condition of the wager; however, the assistant also made selections independent of the examiner's, which were tabulated and considered as part of the experiment.

After the subject had completed the task of concealing the money, he was asked the following series of questions:

(1) Is your name _____ ?
(2) Do you understand what you are supposed to do?
(3) Is the money hidden in the ashtray on chair #1?
(4) Is the money hidden in the ashtray on chair #2?
(5) Is the money hidden in the ashtray on chair #3?
(6) Is the money hidden in the ashtray on chair #4?
(7) Are you sure you understood what to do?

These questions were shown to the subject and he was instructed to answer questions 3 through 6 with the following statement, "No, it is not." The subject was thus instructed to be telling the truth on three of the questions and to malinger on one of them (known as the critical or "hot" question). The other questions were acting as buffer items and the subject was instructed to respond with the words "yes" or "yes, I do". The questions were presented twice, once forward and once in reverse (from 7 backwards to 1). At all times the subject knew both what questions would be asked and what answer he would give.

Following the tape recording of the subject's answers, the PSE analysis was undertaken extemporaneously in the presence of the subject. The examiner's success and failure in making the analysis of the graphically displayed voice tracings (referred to as "charts") was thus presented openly to the subject, as well as any confusion he might register. When the examiner would compare his final tally with the assistant, this, too, was undertaken in full view of the subject. The analysis of the PSE charts was completely a blind analysis, however, with no tricks or deception being employed by the examiner at any time during the experiment.

Results

The results as depicted in Table 1 indicate that no significant findings occured in Trial 1 although there was significant inter-rater reliability ($r=.555$ $df=46$ $p<.01$). On the second trial, however, both the examiner and his assistant were able to correctly select the hidden money significantly beyond the chance level. The examiner selected correctly on six of the 12 cases ($X^2=4.00$ $df=1$ $p<.05$). The assistant, a college senior at Washington and Lee University who had never received the company training course, was correct on seven of the 12 cases ($X^2=7.13$ $df=1$ $p<.01$).

The inter-rater reliability for Trial 2 was also significant ($r=.555$ $df=46$ $p<.01$). The correlation is reported for first choices only in Trial 2, indicating that the stress indicators were sharp and discernable for the critical question but absent on the non-critical questions.

Table 1

	Trial 1		Trial 2	
	No. right 1st choice	No. right 2nd choice	No. right 1st choice	No. right 2nd choice
Examiner	1	4	6*	1
Assistant	2	3	7**	1

Discussion

The results of this early validation study indicate that even under conditions of low to moderate stress the PSE was able to function along the lines predicted by its manufacturers. That is, if one accepts the hypothesis that the wagering situation produced some degree of psychological stress within the students and other subjects - stress deriving both from the challenge of competing with a machine, as well as the gamble - then the PSE was capable of electronically detecting and presenting indications of psychological stress. Furthermore, PSE operators with only minimal amounts of training and experience were able to agree significantly better than chance during independent chart analysis.

The results are not totally unequivocal. The results of the first trial indicated that the examiner and his assistant were not able to detect the hypothesized stress at a better than chance Level, though they did agree on where they thought the stress was occurring. It is not possible to say on the basis of the present results whether this failure was due to a failure of the PSE, improper chart reading, or simply an absence of appropriate psychological stress, or an admixture of any of these factors.

However, based upon the significant inter-rater reliabilities of the first and second trial, as well as the significant findings on the second trial, the authors hypothesize that during the first trial stress was unfocused, generalized, and either random or generated by extraneous cues. Thus, general nervous tension combined with extransous stress-producing cues may have served to mask or obscure whatever specific psychological stress which had been produced by the critical question.

Clearly the PSE offers an attractive alternative to the measurement of psychological stress by other means. Self report inventories and other paper-and-pencil tests are not without value but they are vulnerable to various disortions implitit in any instrument in which a subject makes verbal reports of his inner states. Neither self-report techniques nor direct observation can provide the sensitivity that is possible with electronic measures of physiological changes associated with stress.

The other major instrument for measuring physiological changes related to stress is the polygraph. The PSE does not supplant the polygraph but for many will offer an attractive alternative to it. Utilizing as it does only tape recordings of the human voice rather than sensors attached to the body, the PSE retains greater flexibility, versatility, and ease of handling. It can be used discreetly and even covertly (where ethics permit). It is not humiliating nor painful or harrassing, thus permitting application with children and infants, older people or sick people, and psychotics who might otherwise be intimidated.

It is unfortunate that in the popular press the PSE has received a rather ambivalent reception with some reporters stressing certain ominous overtones about its potential in covert operations. Certainly any instrumentation can be used for unethical purposes. But it seems to the authors that the PSE does not pose any special threat. For example, it has been suggested that someone might try to tape record a presidential news conference from the television coverage and determine if the president was lying. It would of course be possible to analyze the president's speech and one would also be able to detect the presence of psychological stress in it. But unless he volunteered to answer the ques-

tions from a structured interview, it would be impossible to determine if psychological stress derived from lying or other sources. Was the stress caused by a lie, an angry gesture from the crowd, an extraneous thought, or a gas pain? All could produce psychological stress.

Conclusion

It seems to the authors that even from this rather simple experiment a great deal of optimism has been generated. Perhaps most important of all, the PSE generally worked as its inventor claimed it would, dispelling the notion that it is at best wildly exaggerated and at worst a deliberate hoax. The PSE did perform as hypothesized.

Of course the experiment raises many other questions. What different kinds of stress can be measured? How low may the stress levels be and yet remain detectable. What conditions exist which may produce false positive or false positive chart readings and can the PSE be faked? The larger question of establishing the parameters of its capabilities remains still unanswered.

Trying to answer the question of what possible new applications exist for the PSE is fascinating; the author in personal conversation with psychologists and other professionals, as well as written communication, has discovered many varied and creative possible applications for the PSE. Still, full acceptance of this instrument awaits a much fuller, exhaustive study of its reliability and validity.

This study in the authors' opinion demonstrates above all that the PSE can now be taken seriously. It is neither an occult phenomena nor a hucksters trick but a technological breakthrough which may provide a tool of enormous potential for a variety of fields, of which psychology merely is

one. We do not yet know the limits of its scope. This study does suggest that the PSE is an accurate, portable, and versatile instrument for assessing the presence and degree of psychological stress and as such merits far more attention than it now is getting.

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The Synopsis, Summary and Conclusions

from

COMPARISON OF VOICE ANALYSIS AND POLYGRAPH AS LIE DETECTION PROCEDURES

A Study

by

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Fordham University

August, 1973

The findings of this report are not to be considered as official Department of the Army position, unless so designated by other authorized documents. Prepared for the U. S. Army Land Warfare Laboratory, Aberdeen Proving Ground, Maryland 21005.

SYNOPSIS

Two voice-analysis techniques were evaluated as lie detection devices in a simulated theft experiment which utilized 174 subjects. One group of subjects (n = 137) was examined with the polygraph at the same time as voice recordings were taken. A smaller group (n = 37) was tested only with voice recordings. Both groups of subjects consisted of male and female university students.

The results failed to demonstrate that either of the voice-analysis techniques was effective in identifying the three basic roles (Thief, Lookout, Innocent Suspect) of the simulated theft. In contrast, the polygraph achieved an accuracy score of 76 percent, a value comparable to that obtained in previous studies using the simulated theft paradigm. Independent raters, who knew nothing about the characteristics of the persons examined, also obtained significantly high accuracy scores in the examination of the polygraph charts (50 - 60 percent).

Although the overall results obtained from voice recordings were not statistically significant, lower voice-accuracy was obtained with polygraph-tested subjects than with those who were examined without the polygraph.

A subsidiary result concerns the ratings of tape monitors who were present during all interrogation sessions. Basing their judgments only on their immediate global impressions, they were able to discriminate between the thief, lookout, and innocent suspect with a significant degree of accuracy. This capability together with the highly significant accuracy scores of the polygraph examiners, demonstrate that the simulated theft procedure is valid for lie detection research, in that it induces in subjects a sufficient degree of emotional responsiveness and involvement to enable the polygraph examiners and tape monitors to differentiate among the three basic roles of the simulated theft situation.

The failure of the voice-analysis techniques to detect these differences cannot, then, be attributed to insufficient emotionality in the subjects. Rather it would seem to be a matter of insensitivity or other inadequacy in the devices themselves in their present state of development.

CHAPTER 4. SUMMARY AND CONCLUSIONS

The major purpose of this research was to evaluate the voice-analysis technique, as represented by two existing types of instrument, for its suitability in lie detection applications. The basis for evaluation was a comparison of voice-analysis techniques against an established technique, the polygraph, in terms of the success of each in detecting lying responses. Additionally, the results obtained with the voice-analysis instruments were compared to those yielded by trained polygraph operators and auxiliary experimenters making their judgments on the basis of direct observation of the behavior (verbal and non-verbal) of subjects being interrogated. Essentially the findings indicated the clear inferiority of voice analysis, in its present state of development, not only to the polygraph, but also to judgments made on the basis of simply observing subjects' behavior.

The experimental procedure involved the execution of a simulated theft of money by a pair of subjects, one of whom served as a lookout for the other, the thief. For each "guilty" pair, there was also an "innocent" subject who knew only that a theft had been committed. Each such triad was interrogated immediately following the commission of the "crime," and the judges' task was to determine the roles played by each: who was the Thief, who the Lookout, and who the Innocent Suspect.

Tape recordings of all the interrogations were made for voice-analysis purposes. Additionally, polygraph records were made of the interrogations of approximately 80 percent of the triads. The remaining triads were questioned without the polygraph.

Interrogation proceeded in three stages. First, subjects responded to a questionnaire of the Relevant-Irrelevant type. Second, they took a modified Peak-of-Tension test involving the exact amount of money that was stolen. Third, subjects were given an Association test to two series of words, which included critical words relating to the crime. The interrogation was conducted by two persons, the Examiner who actually posed the questions, and a Tape Monitor whose function was to control the volume for the tape recording.

Following the interrogations, decisions as to the role played by each member of a triad of subjects were made in a variety of ways by a number of researchers associated with the experiment in different capacities. The Examiners and Tape Monitors made judgments immediately following the interrogation, using as the basis for their judgments their overall, global "impressions" of the subjects' behavior during interrogation. Additionally, during the polygraph examination the Examiners could see the chart print-out as questioning proceeded but had limited opportunity to note the details of the record at this time.

Approximately two weeks after an interrogation, each of the Examiners made a careful, formal analysis of the polygraph records, using established criteria in which they had been trained. They analyzed the records in sets of three (triads) and indicated which record was that of the Thief, the Lookout, and the Innocent Suspect.

At a later time, two other experienced polygraph operators (not actual Examiners of the subjects) also analyzed the polygraph records. These raters evaluated each record on an individual basis, independently of any other records, and rendered a judgment as to the role that subject played in the experiment.

The third type of evaluation involved the analysis of the tape recordings by each of two current voice-analysis techniques: The Dektor Psychological Stress Evaluator (PSE) distributed by George F. Cake Co., and the Voice Stress Analyzer (VSA) manufactured by Decision Control, Inc. In point of time, the behavior of the subject was evaluated first; his polygraph chart, second; and his voice recording, last.

The results may be summarized as follows. On the basis of immediate global impression, both Examiners and Tape Monitors identified subjects' roles in the "theft" to a significantly high degree, with the Examiners who could see the polygraph charts, not surprisingly doing somewhat better than the Tape Monitors. The accuracy with which these immediate impressionistic judgments could be made provides evidence that the paradigm of the simulated theft is a valid experimental procedure for lie detection research in that it does in fact induce differentially detectable behavior in subjects.

Analysis of the polygraph records produced the following results. Evaluating the records they had obtained in triads, Examiners attained an overall accuracy of 76 percent. Each role (Thief, Lookout, Innocent Suspect) was identified with approximately equal success.

There was some indication of differential detectability of lying according to sex of the subject; the Examiners were notably more accurate in evaluating the records of male than of female subjects (83 percent versus 65 percent). The reason for this difference is not readily apparent.

The success of the Examiners leaves no doubt that the polygraph was an effective instrument of detection in their hands, of sufficient precision to discriminate degrees of guilt (Thief vs Lookout), as well as distinguishing guilt from innocence. Here, again, this success supports the validity of the simulated theft as an experimental paradigm in the study of differential emotional reactivity.

When the polygraph charts were analyzed on an individual basis (not in triads) by the two other experienced polygraph operators who had not participated in the actual interrogation, subjects' roles in the experiment were again identified with a significant degree of accuracy. On the other

hand, the constraints of individual analysis did produce accuracies somewhat lower than those obtained in triad analysis by the Examiners (50 - 60 percent versus 76 percent). Errors, when made, tended to be in the direction of an "innocent" verdict. Contrary to the results obtained in triad analysis, accuracy with female subjects was slightly, but not significantly, higher than with male subjects.

The results obtained with the voice recordings were generally insignificant. The operator of the Dektor Psychological Stress Evaluator analyzed the tapes on both an individual and a by-triads basis. Working with individual records, he obtained accuracies close to 33 percent, a value almost identical with chance expectation. In the triad analysis, the PSE analyst did worse with polygraph subjects (19 percent accuracy). However, he did significantly better with non-polygraph subjects, attaining an acceptably high accuracy of 53 percent. It is possible that the absence of stresses, attendant upon being fitted up with the polygraph attachments, produced clearer voice records for the non-polygraph subjects.

This cannot be the entire explanation, however, for the overall poorer showing of the PSE. For example, the nine polygraph triads evaluated by PSE analysis with an accuracy of 19 percent, were identified by the Examiners with an accuracy more than twice as great (44 percent). As for the non-polygraph subjects' records, the 53 percent accuracy of the PSE operator was surpassed by even the Tape Monitors, who obtained 83 percent accuracy in their immediate global judgments of these triads. In sum, the PSE analysis yielded either insignificant or non-competitive results.

The Voice Stress Analyzer generated a numerical value for each "Yes" or "No" response during the interrogation. These values were transformed into judgments comparable to those obtained from the PSE analyst. It was found that neither polygraph or non-polygraph subjects attained a significantly greater value than the chance expectation of 33 percent. However, the trend observed with the PSE, toward slightly greater accuracy with non-polygraph subjects, was also apparent with the VSA.

The conclusion of this research is that neither of the presently existing voice-analysis instruments may be accepted as valid "lie detectors" within the constraints of an experimental paradigm.

The Kubis Report of 1973: An Invalid Study

Critical Analysis

by

Dektor Counterintelligence & Security, Inc
Springfield, Virginia

In 1972 Forham University was awarded a contract by the U.S.Army Land Warfare Laboratories to validate a prototype of a voice analysis method for improved rapid interrogation. A comparative study was to include a Stoelting polygraph and a Dektor PSE. Joseph F. Kubis authored the report of the study.

A. THE OBJECTIVE OF THIS CONTRACT WAS NOT ADDRESSED BY THE SPECIFICATIONS.

1. The stated objective of the contract was, "to validate the (voice analyzer) in as realistic situations as possible to determine how reliably the instrument(s) can indicate when a subject is being deceitful".

a. The contract specified "a simulated theft situation as the basis for the interrogations... involving three (3) subjects in each test: (1) the thief, (2) the lookout, (3) an innocent suspect who shall have no knowledge of the role of any of the suspects or of the crime."

In a recent issue of Journal of Forensic Sciences (October 1973) there is a review of experiments in the polygraph literature. There are two notable facts in this article which are relevant to this point:

(1) Experimental studies through the years have consistently given poorer accuracy results than actual field use of the polygraph.

(2) Kubis' experimental studies in 1962-63, in which he also used the triad of suspects, were notable as giving the poorest results of all the studies reported in the article.

b. The contractor was given the option of addressing the objective by using "polygraph examinations of actual criminal investigations... for all or part of the... tests provided that tape recordings of these examinations are available for use with the (voice analyzers)."

Since the tape recording of criminal suspect examinations is now fairly standard, it is apparent that this option would have been a reasonable definite specification addressed to the objective. However, the option was not required, nor was it performed by the contractor in whole or part.

c. The contract specified that the polygraph record "will be analyzed in the manner usual to such procedure" (simulated theft).

The manner used, as in Kubis' previous simulated theft experiments, is referred to as "triad analysis". Inherent in this analysis is the knowledge that there are three possible roles for each suspect and that there is only one suspect in each role. This type of analysis is neither realistic nor possible to the real polygraph examiner, who in any investigation of a group of three suspects involved in a single crime, is faced with the fact of ten possible combinations of criminals, accomplices and/or innocents.

2. The objective further states, "The reliability and accuracy will be compared to that of a standard polygraph as used by an expert examiner."

a. The specifications make no reference to the type of structured examination used by an expert polygraph examiner. The standard examination is, in fact, designed to identify response to a known lie, the possible presence of a guilt complex, and outside issues worrying the suspect. Questions addressing these problems are standard in any examination performed by an expert examiner.

None of these types of questions were included in the interrogation used in the experiment. Moreover, when the question structure was shown to the expert examiner who had been selected for the voice analysis part of the study, he refused to participate and resigned from the project.

b. The triad analysis in 1-a above is also not part of the use of the polygraph by an expert examiner, as previously discussed.

B. CERTAIN SPECIFICATIONS OF THIS CONTRACT WERE NOT PERFORMED, AS DISPLAYED IN THE FINAL REPORT KNOWN AS THE KUBIS REPORT.

1. The contract specified, "Tape recordings of the polygraph examinations will be made and these will be used for the other instruments. Care must be taken to provide tape recordings with high fidelity, a minimum of background noise and of sufficient amplitude to be usable with the voice analysis instruments... An analysis shall be made for each subject showing the accuracy of each instrument."

a. Although 137 polygraph examinations were administered, only 135 were evaluated on polygraph. Moreover, only 87 of these were evaluated on the VSA, and

only 49 on the PSE, with no indication that the group of 87 included any of the 49. Further, there is no indication that any of the 174 subjects were analysed on all three instruments as specified in the contract.

b. Although Kubis makes no mention of any possible reason for the missing data, it is known that the recordings which were sent to the sub-contracted PSE analyzer were of such poor quality that most had to be returned as completely useless. Those not returned were analyzed on a "best efforts" basis in the interest of salvaging the contract.

2. The contract specified, "In addition, the operator shall evaluate each response in terms of stress shown and height of that stress... (and) a chart shall be made for each subject showing where possible, the level of stress each instrument indicated for eacn response for that subject and also the ground truth."

a. Such a chart does not appear in the report, not any data on which to draw up such a chart.

b. With only one exception, the charts which do appear in the report show accuracy in determining only the role of each subject.

c. Further, the report contains no chart comparing degree of accuracy on the 49 subjects which were analysed on both polygraph and PSE.

C. SUFFICIENT VARIABLES WERE UNCONTROLLED AS TO RENDER THE KUBIS STUDY SCIENTIFICALLY INVALID IN RESPECT TO BOTH RESULTS AND CONCLUSIONS.

1. While the examination attempted to distinquish between a truthful statement and stress caused by deception, no questions were included to control (by identification) "stress" originating from other causes, such as personal worries, guilt complexes, nor to identify for comparison the stress of a known lie involving emotional or ego involvement. Moreover, emotion-producing words were not avoided. These controls are normally part of a real polygraph examination.

2. Experimental procedure varied during the course of the experiment, causing uncontrolled variations in stress. Some subjects were recorded with a polygraph attached, some without. The placement of the microphone was changed from a table to the person of the subject, on a cord around his neck.

3. Quality of data collected varied, as exemplified in the rejected tape recordings.

4. The number of data items differed by almost three to one, yet were compared as if equal, e.g., 137 polygraph subjects compared to 49 voice analysis subjects.

5. The number of raters differed for the instruments tested. While two "expert" and four "trained" examiners totaled six for the polygraph, there was only one PSE rater used for comparison, thus providing no check on examiner reliability.

6. Method of rating used by the "expert" polygraph examiners differed, with one attaining 10.5 percentage points lower than the other.

7. Qualifications of the raters varied from "expert" to graduates "given a short course in the operation of the polygraph". The synopsis of the report cites accuracy statistics which do not differentiate among the findings.

8. The highest accuracy scores reported were attained by the tape monitors recording their impressions for only nine of the twelve triads which were tape recorded only. The scores were based on partial data apparently selected at their own discretion. These scores were described as 83% on page 33 and 89% on page 25 of the study.

D. CONCLUSIONS.

1. Award of this contract to Kubis on the basis of the specified structure and procedure suggests ignorance, at best, on the part of the contracting agency.

2. As reported in the study report, performance of this contract, in respect to both structure and procedure, met neither the specifications nor the objective of the contract.

3. Results and conclusions of the Kubis Report, based on insufficient scientific controls, appear to be invalid.

4. The public funds paid out for the Kubis Report should be returned, on the basis of non-compliance.

5. Restitution is deserved by the profession of examiners upon whom this report reflects, at the least in the form of public dissemination of a declaration of its false authenticity by the contracting agency, the Congressman who was instrumental in its release, the Army Review Board who was instrumental in its release, and the newspapers who implied that the Army had endorsed the study.

Review of Psychological Stress Evaluator Validity Studies

Prepared For

THE FOREIGN OPERATIONS AND GOVERNMENT SUBCOMMITTEE

By

Dektor Counterintelligence and Security, Inc., June 1974

In general, the design of a validation study can be approached from either of two viewpoints. One method is to set up a controlled situation in a laboratory; the other is to observe in the field actual occurrences of the event under study.

For a laboratory study to be valid, there must be present in the laboratory, either by chance or by design, that subject of investigation for which the study is designed. The problem becomes one of exact reproduction in the laboratory of that which has been observed "in the field" as a real occurrence. If the experimenter is attempting to study the act of lying, for example, he must ensure that the model situation involves not only a simple statement contrary to fact, but also the emotions normally accompanying and motivating the act of lying, and the real rewards and/or jeopardy usually contingent upon the success of an attempted deception.

A perusal of the literature of published reports involving the polygraph as instrumentation for "lie detection", reveals that this problem of models has not been overcome: experimental studies attempting to "simulate" a lie have consistently shown poorer accuracy results than field use of the polygraph. A recent article in the Journal of Forensic Sciences (October 1973) chronicling these results throughout the polygraph literature, makes special note of the poorest accuracy obtained, in experimental laboratory studies conducted in 1962 and 1963 at Fordham University by Joseph F. Kubis, using a method of his own design called triad analysis of a simulated theft situation.

This same Dr. Kubis, coincidentally, was awarded a contract in 1972, by the U. S. Army Land Warfare Laboratories, to conduct a study to validate a prototype of a voice analysis method (spectrum analysis) as a rapid means of "lie detection". The study included, for comparison, a Stoelting polygraph and a Dektor Psychological Stress Evaluator.

In spite of, and in contrast to, the stated objective of the study, to use "as realistic situations as possible", Dr. Kubis again chose his simulated theft situation as the basis for his experiment. Roles of "thief" and "lookout" were assigned to experimental subjects who were given a scenario to act out, and an innocent "suspect" was chose to complete each triad. The "thief" and "lookout" were instructed to lie about their part in the scenario. The structured tests administered after the performance differed largely from the standard "lie detection" examination in that they contained no questions designed to identify response to a known lie, the possible presence of a guilt complex, or possible presence of an outside issue worrying the subjects. Moreover, the triad method of analysis, used to evaluate the instrumented responses to the questions, bears no resemblance to any method of analysis available in the field.

In short, the hypothetical nature of Dr. Kubis' experiment of 1973 reproduced, not suprisingly, the poor results of his previous studies, and in no way provided the Land Warfare Laboratories with a valid, realistic assessment of any of the instruments used in the experiment. Dr. Kubis concluded in this report that the voice analytic techniques cannot be validly used as "lie detectors" within a simulated theft paradigm. The polygraph accuracy figures (51% and 61%, in those tables not taking advantage of the triad analysis) of the two polygraph examiners serve to underline Dr. Kubis' lack of success in overcoming the problem of a simulated theft model. (See Annex H for Synopsis, and Summary and Conclusions of the 1973 Kubis Report. Also see Annex I for a more detailed analysis of the Kubis Study).

Another attempt at validating the "lie detection" capabilities of the PSE in a laboratory simulation was made in a pilot study in 1973 by James W. Worth and Bernard J. Lewis at Washington and Lee University. According to the abstract of this study, "twelve subjects were placed in a wagering situation designed to heighten their psychological stress. Money"(some sum up to $1.00)" was concealed by the subject in one of four locations and the examiner then bet each subject that he could determine the location of the money by analyzing the subject's voice during a structured questioning period. Two trials were given for each subject. Although the PSE was unsuccessful on the first trial, on the second trial both the examiner and his assistant were independently able to select correctly the location of the money at a level significantly better than chance."

The percentage of correlations in this laboratory model, 50% for one examiner and 68% for the other examiner, would have been un-acceptable in a real-life "lie detection" situation. The authors postulate that on the basis of the significant inter-rater reliabilities in both trials, "general nervous tension combined with extraneous stress-producing cues may have served to mask or obscure whatever specific psychological stress had been produced by the critical questions." (See Annex G for the complete text of this study).

This comparison between simulated and real-life experiments was illustrated by a paper entitled "Use of Voice Changes in the Detection of Deception" by Gordon H. Barland of University of Utah in 1973. This study reported the correlation results of PSE charts for a group of 16 subjects in a low stress "lie detection" situation: the detection rate was not significantly different from chance. For a second group of 14 subjects in a high-stress "lie detection" situation as criminal suspects in a police investigation, charts from both polygraph and PSE were available but unfortunately validity statistics for neither instrument could be provided, since only six (6) of the 14 "deception indicated" polygraph decisions were completely confirmed.

This group of examinations did provide an opportunity to test the correlation of conclusions obtained from four different physiological parameters in a high-stress situation. By applying a numerical rating system of his own devising, the author determined for each physiological measure, the cut-off points between inconclusives and the two decisions of "deception indicated" and "no deception indicated". The author concedes that his range for inconclusive was "somewhat arbitrary" and could be argued to be "unduly conservative", and consequently offers a chart (Table 7 of the study) for each physiological parameter with the inconclusive boundaries varying from 0 to plus or minus 2. When the inconclusive region between the decisions was reduced to the single score of zero, a comparison of the physiological parameters reveals no errors and no inconclusives for the galvanic skin response measurement, and one inconclusive with no errors for the voice measurement; the 2 other parameters ranged from 3 to 5 inconclusives, with 1 to 3 errors. The greatest correlation obtained, therefore, between any two physiological parameters existed between the voice and the galvanic skin response (.63) while the greatest correlation obtained between any two of the polygraph measures was slightly less than that (.59).

The author concludes, "The results of the high-stress study clearly shows that reliable changes occur in the voice which are correlates of short-term psychological stress evidenced by changes in the autonomic nervous system. Yet no significant results were obtained in the low stress study. This suggests the hypothesis that a certain amount of stress must be reached within an individual before reliable stress-related changes occur in the voice."

Contrasted with these laboratory experiments is a real-life study carried on in the field, in 1971, by Lt. Michael P. Kradz, Chief Polygraph Examiner for the Howard County Police Department, Ellicott City, Maryland.

Lt. Kradz used as subjects for his experiment, the felony suspects for whom a "lie detection" examination was routinely requested by the Department or by the other investigative agencies whose requests were referred to him. The proportion of innocent and guilty suspected criminals and accomplices was random and unknown at the time of each case. The "lie detection" examinations were administered with the standard routine of pre-test interview, standard question structuring, standard post-test interview, and in several cases a second examination as indicated. Forty-three examinations were instrumented simultaneously with a Stoelting polygraph and a Dektor Psychological Stress Evaluator, and the determination of "guilty attempted deception" or "no attempted deception" was validated by means of independent corroboration, either by substantiating police investigation or by no evidence to the contrary being uncovered by the police investigation.

Using this independent corroboration as the standard for interpreting the correctness of his chart evaluation for each case, validation became available for all 43 subject examinations, covering 295 relevant questions involving the identification of guilt, complicity or innocence in connection with the specific crime under investigation. The crimes committed were real; the jeopardy of life or liberty was real; the accuracy success with the Dektor PSE was 100% (See Annex B for the complete text of the Kradz study).

Also contrasted with the simulated experimental models is a study performed by G. Alan Smith, Resident Psychologist at the Powick Hospital, Worcester, England.

For his study of the validity and reliability of the Dektor Psychological Stress Evaluator as a diagnostic tool in the treatment of psychiatric patients,

Dr. Smith used 15 subjects who comprised all those patients attending his office for therapy during a two-week period, all referred from psychiatric out-patient clinics because of symptoms of neurotic anxiety, and all under various stages of treatment. Administered to each patient was a questionaire consisting of several sections of the Eyesenck Personality Inventory, plus that test's full section of items designed to identify subjects who fake their responses.

Each patient was given a list of ten common life-stressors, including several stressors peculiar to the individual patient as indicated from his Eyesenck Personality Inventory, and asked to report Yes or No to the question of whether he was worried about each of the stressors.

Each patient was then instructed to read aloud, for tape recording, his list of stressors. The anxiety caused to the patient was assessed by evaluating Dektor PSE charts, and a comparison was made between the stress thus shown and the patient's self-report about each of his anxieties. The degree of correspondence between the two was compared, for validity, with the patient's score on the Eyesenck Lie Test. The correlation between those denied stressors showing stressed readings and significant lie scores was 98%. (See Annex G for the complete text of the 1973 Smith Report, "Analysis of the Voice").

In his review of polygraph literature, in which he compares the accuracy of laboratory experiments (mean: 81%) with the five completely verified studies of crime investigations, (mean: 100%), Abrams points out, "It is believed that laboratory research will continue to demonstrate consistently lower accuracy until such time as a research paradigm can be developed that will create a situation that is comparable to an actual criminal investigation. In some manner, the fear of detection, the tension, the conflict, and the possible feelings of guilt must be all incorporated into the experimental situation. In addition, trained and experienced examiners employing acceptable polygraph instruments must be used as well as attempts made to deal with all of the other weaknesses described earlier. Until that time, laboratory and field research are not comparable."

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Additional Views of Hon. Donald Rumsfeld

This report apparently concludes that because of questions raised concerning the use of the polygraph, the proper course of action is, for all practical purposes, to suspend the use of the polygraph by agencies of the Federal Government, pending completion of Government study and research concerning this instrument. I disagree. While earlier hearings of the subcommittee indicated a lack of controls and standards, this is, for the most part, being corrected at the present time. Polygraph examinations are voluntarily taken. There is a lack of evidence citing specific instances of harm to the individual within the Federal Government. It is my conclusion that while the research and study concerning the polygraph is necessary and desirable, the agencies of the Federal Government should not be denied the use of the polygraph as an investigative tool, pending completion of these studies. For these reasons, I must dissent from this report.

Throughout the history of this country, the pendulum of Government action, whether executive, legislative, or judicial, has moved between the two equally undesirable extremes of excessive protection of the rights of the individual at the expense of society as a whole and the excessive protection of society at the expense of the rights of the individual. Each is equally important. A delicate balance between the two is desirable, but difficult to maintain. As society changes, we must be alert to see that the pendulum does not move to either extreme. At this point in history, it is my conviction that the pendulum has moved off the balance, and that this report could further upset the balance to the detriment of society as a whole.

The subcommittee conducted a series of hearings on polygraphs in 1964 and 1965 and issued a report in March 1965.

In these hearings, evidence was obtained which revealed that 19 Government agencies utilized the polygraph in criminal and security investigations, and that some used the instrument in preemployment testing. The evidence also revealed that (1) some agencies were utilizing polygraphs indiscriminately, (2) there were no uniform qualifications for the selection or training of polygraph operators, (3) there were no adequate standards developed for the use of the polygraph, (4) there was inadequate supervision over polygraph operators, and (5) there was insufficient data on the reliability or value of polygraphs.

To this extent, the hearings served an extremely useful purpose in that they pointed up instances where the rights of individuals were not being fully observed and protected. However, instead of confining its activities to correcting these abuses, the subcommittee in its first report recommended drastic restrictions on the use of the polygraph and cast doubt upon the use of the polygraph under any circumstances. Now, this second report to be issued by the subcommittee, without having developed new evidence, seeks to cast further doubt upon the use of polygraphs.

I cannot join in the conclusions drawn or in certain of the recommendations made in the report.

The polygraph is not a "lie detector" and, contrary to the inferences presented by the title and repeatedly in the body of the report, no agency of the Federal Government, to my knowledge, today considers or uses the polygraph as a "lie detector."

The polygraph merely measures certain identifiable physical reactions such as respiration rate, blood pressure, pulse rate, and galvanic skin response. Scientists who testified before the subcommittee and others who have studied the polygraph indicate that under proper conditions there is a probability greater than chance that the average person will register certain physiological changes above or below normal if that person attempts to conceal knowledge of a matter. By observing these changes, a trained investigator will be in a position to conduct further investigation through the use of other investigative methods.

The evidence before the subcommittee indicates that Government investigators do not conclude that persons are lying or are confessing guilt solely on the basis of polygraph readings. Rather, it is my understanding that they properly regard the polygraph as simply one aid in investigation. A few agencies involved in top secret matters also use the polygraph on certain occasions to screen the backgrounds of persons seeking employment. As the Assistant to the Director of the FBI stated at the hearings:

> The polygraph is just an instrumental device to assist the interrogator, but the technique is basically an interview, an interrogation, a trained skilled interrogator attempting to get the truth from an individual in a matter in which we have jurisdiction.

As indicated above, the hearings did disclose that there were some deficiencies associated with the use of the polygraph in some agencies and that there were some deficiencies in the training and supervision of polygraph operators within the Government. But, sufficient evidence has not been developed to conclude, as this report does, that there today exists widespread misuse of the polygraph, as may have been the case when the first report was issued, or that it should be prohibited "in all cases but those clearly involving the nation's security", whatever that phrase may mean.

Today, we are witnessing an ever-increasing series of circumstances which hamper efforts to detect, prevent, and curtail crime. Each year, the rate of crime increases while the rate of conviction declines. Similarly, at a time when the United States is engaged in hot wars and cold wars to halt Communist expansion and subversion, we see growing restrictions on these efforts. The rights of the individual must be protected. But, we must not unnecessarily restrict the ability of the Government to protect society as a whole by hampering its ability to detect and punish criminal behavior and breaches of security to a degree which jeopardizes the rights of all its citizens.

The Department of Defense is presently engaged in conducting research in six broad areas of polygraph operations. The Interagency Polygraph Committee, appointed by the President in November 1965, is presently engaged in a study of the needs and uses of polygraph operations in the various agencies of the Government. Neither the research nor the study have been completed. Until they are, this committee is in no position to judge, as does this report, whether the

use of polygraphs should be further restricted or in what ways their use should be modified. To do so at this time is without justification and without clearcut knowledge as to how such action might further impair the Government's ability to resolve or reduce crimes and breaches of security is unwise.

I believe that all areas of polygraph operations must be researched and studied, including such matters as (1) the amount of time polygraph operators should devote exclusively to administering polygraph exams, (2) the number of persons who have been refused employment or discharged as a result of polygraph exams, (3) the number of persons who have been found to have committed crimes or breaches of security in spite of having undergone polygraph preemployment tests, (4) the punishment, if any, of those employees who have refused to take polygraph exams, (5) the supervision of polygraph examiners and review by higher authorities of test analyses, (6) the procedures, if any, for appealing the reports of polygraph test results, (7) the skill and fairness of polygraph operators in interrogating subjects, (8) the means by which a polygraph operator or his supervisors can determine whether a subject is mentally or physically able to undergo a polygraph exam, and (9) the caution to be exercised in the filing and use of polygraph information.

The directives by the Department of Defense, its supporting agencies, and the military services establishing uniform standards and control over the use and operation of polygraphs are reasonable and desirable steps toward the goal of avoiding any possible misuse of the polygraph. The establishment of a uniform administrative system on the use of polygraphs throughout all Government agencies and the provision for regulations to prevent their misuse is also desirable.

To go beyond these conclusions or recommendations at this time, however, is both unwarranted and unwise. The subcommittee presently lacks the evidence to do so. By so doing, it may be jeopardizing the ability of Government to exercise its responsibilities in protecting the Nation's freedom and the freedom of its citizens. The subcommittee should withhold issuing additional reports on polygraph operations until the research now in progress has been performed, the studies have been completed, and sufficient knowledge has been developed to permit intelligent conclusions to be drawn.

I, therefore, must dissent from this report.

DONALD RUMSFELD.

ADDITIONAL VIEWS OF HON. WILLIAM L. DICKENSON, HON. JOHN N. ERLENBORN, HON. ROBERT DOLE, AND HON. JACK EDWARDS

We generally concur in the additional views of Congressman Rumsfeld. But, since we were not members of the Committee on Government Operations when the hearings on the use of polygraphs were conducted, we are not in a position to approve either the report of the committee or the additional views.

In reading through the hearings and the committee's report, however, we do not find sufficient evidence to support its conclusions. While the hearings and report of the committee disclose instances where some agencies of the Federal Government have been lax in administering polygraph examinations and in supervising and training polygraph operators, little or no evidence was uncovered where a polygraph examinee had been falsely accused or otherwise harmed through a polygraph examination administered by a Federal agency. For these reasons, we believe that the committee should not issue additional reports on this subject matter until adequate research and study have been conducted to sufficiently ascertain whether or not the polygraph is a reliable investigative tool in criminal and national security cases and whether or not it may be used without imparing an individual's legal and personal rights.

WM. L. DICKINSON.
JOHN N. ERLENBORN.
ROBERT DOLE.
JACK EDWARDS.

Mr. MOORHEAD. Dr. Heisse?

Dr. HEISSE. Thank you. I am John W. Heisse, Jr. I am here at my own request. I am, at the present time, the president of the International Society of Stress Analysts, a board certified otolaryngologist practicing in Burlington, Vt.; an active clinician and researcher; and, a concerned citizen from the State of Vermont.

I am firmly convinced that many systems do adequately and accurately reproduce and portray psychophysiologic stress. Two of these systems are the polygraph system and the psychological stress evaluator system. Both are multipart systems. Both work well in the expert hands of competent, qualified, well-trained, knowledgeable individuals.

I have submitted to the chairman of this committee a lecture which was presented by me to the Legislative Subcommittee on the Rights of Privacy of the California Assembly Committee of the Judiciary. In this paper I have drawn parallels.

Most important is the fact that the paper traces the history of the polygraph through the judicial system and ends with the excellent opinion offered by the presiding judge in the case of the *United States of America* v. *Errol Zeiger*, which was rendered in the U.S. District Court in the District of Columbia on October 10, 1972. The judge's opinion is reproduced by my lecture beginning on page 16. I would hasten to say that his opinion was overturned, but it is well worth reading.

I firmly believe that as these systems evolve and gain acceptance or denial, they should be done so as part of judicial case law, a system of the people, by the people and for the people.

At present, I am convinced that these systems do work well in the hands of well-trained, qualified, and competent individuals, and these systems do have a rightful place in the agencies of the Government of the United States of America.

Thank you very much.

[Dr. Heisse's prepared statement follows:]

PREPARED STATEMENT OF JOHN W. HEISSE, JR., M.D., PRESIDENT, INTERNATIONAL SOCIETY OF STRESS ANALYSTS, BURLINGTON, VT.

PREFACE

This lecture prepared for the California Legislative Subcommittee on Judicial Procedure has also been presented in Florida to Mr. William O'Neill, referee for the Florida Secretary of State.

It endeavors to bring case law on polygraph up to date in the federal cases and establish the correct means of interpreting other means of analyzing psycho-physiologic stress.

LEGISLATIVE SUBCOMMITTEE ON THE RIGHTS OF PRIVACY

THE ASSEMBLY COMMITTEE ON THE JUDICIARY

CHARLES R. WARREN, CHAIRMAN

CALIFORNIA STATE LEGISLATURE

SACRAMENTO, CALIFORNIA

PROLOGUE

I should like to express my profound gratitude to this committee and to its staff for the privilege of being allowed to be heard. I am here at my own request, and I am here as a representative of the International Society Of Stress Analysts. The International Society Of Stress Analysts (herein called I.S.S.A.) was formed because it was felt that the American Polygraph Association and its members did not have standards high enough to meet those which were necessary to safeguard the rights of individuals. This society is founded and registered in the State of New York. There is a subchapter in the State of Florida.

I will submit to this committee two copies of my curriculum vitae for evaluation by the committee and its staff members. To update this curriculum vitae it should be noted that:

1. A paper entitled "Is The Micro-Muscle Tremor Usable?" has been submitted for publication in The Laryngoscope.

2. I have been asked by Mr. Richard Allen, the editor of The Journal Of The American Bar Association, to submit an article for consideration for publication on the status of truth deception in the United States today.
3. A paper is being prepared for Laryngoscope using laryngectomies to isolate the source of the micro-muscle tremor in the voice.
4. Current research* is being done on the effects of drugs in truth verification techniques. I am prepared to submit to this body the accumulated raw data of this and any other study which has not been completed if the committee or staff so desires.

This committee and its staff is to be commended for their diligent search for the truth and for their desire to protect the rights and privileges of all the citizens inhabiting this great country.

I would chide those who want you to rush and hasten, for on your shoulders may rest many laws that will be enacted throughout these great United States States of America.

To the accusers, seeing only one side of the question, I would quote from the 7th Chapter of Matthew the first and second verses:

1. 'Judge not, that ye not be judged.
2. For with what judgement ye judge, ye shall be judged; and with what measure ye mete out, it shall be meted out to you again."

*See page 2A.

(a) Hypnosis, Truth Verification, Polygraph, And The PSE.

(b) Comparison Of The PSE-1 And The PSE-101.

(c) Stress Levels In A Random Population Utilizing Decade Comparison With The Common Denominator Of Death (PSE).

(d) Identification Of Critical Areas Of Concern In High School And College Students Who Present Themselves For Counselling (PSE).

(e) The PSE As A Medical Tool To Rapidly Isolate Patients Major Problems - Both Conscious And Subconscious.

(f) The PSE In The Evaluation Of Suicidal Patients - Are They Going To Commit Suicide?

(g) The PSE In Screening Parolees.

(h) The PSE In Altitude Verification In A Random Selection Of IFR And VFR Pilots.

(i) The PSE As Used To Establish The Upper Stress Levels In Air Traffic Controllers.

(j) The Individual Signature In PSE Examinations.

(k) A Review Of The Alger Hiss - Wittaker Chambers Testimony.

(l) Potential Use Of The PSE By The Internal Revenue Service And Against The Internal Revenue Service In A Field Audit.*

(m) An In-Depth Study Of The Execution Of The Wrong Person.

*Before anyone rises in indignation, I hasten to say my own audit was used and no others.

(n) *The Effect Of Drugs On The PSE: The Use Of The Death Test.*

(o) *Change In Stress Patterns Of PSE Tracings Produced By The Alpha State.*

(p) *Is A Person Hypnotized? Confirmation By The PSE.*

You of this committee and its staff are in a difficult position! You must establish what is the truth before the truth is totally known. You must advise legislation that may become in the very near future void for vagueness if it is not already so. I would point out that the current legislation in California concerning acupuncture that establishes that the practice of acupuncture can only be carried out in a medical school is undoubtedly in this category; or even more ridiculous, in the State of Nevada where the legislature stampeeded to create a board of Chinese medicine in order to allow the citizenry to have acupuncture we now find a state that has made it legally impossible for a Western trained physician to insert a needle into the human body. If you need a drug that is given by hypodermic injection, it is illegal for a Western trained physician to administer it. Hopefully this law will be ignored.

I am here as a theoretical expert ... you know, a man who knows more and more about less and less, or, to use another definition, a person who is from more than 100 miles away. I would like to consider myself as an amicus curiae to this committee and its staff.

If you talk to a person from Boston or from the East Coast, they firmly believe and fervently pray that the sun rises and sets over the Eastern 13 colonies. It would devastate them to know that each new day first appears as the sun rises over the orient, or as Kippling has so aptly put it, "The sun comes up from China cross the way."

I am persuaded that in the United States of America that legal good and evil, medical good and evil, social good and evil, all arise here on the West Coast and it rolls as a tide ever eastward. By the time the easterners are saying, "Ah yes thus is so or that is a fact," another new, different, and diametrically opposed title opinion has been formulated here on the West Coast and is sweeping the old concepts away as it rolls ceaselessly eastward. THAT GENTLEMEN IS WHY I URGE CAUTION IN YOUR DELIBERATION!

As it has been stated in the First Corinthians the 13th Chapter the 12th verse:

> "For now we see through a glass, darkly; but then face to face: Now we know in part, but then shall I know even as I am known."

I would urge you to be careful until the glass of truth verification is not dark and the full truth of the truth verification becomes known.

When we cannot believe something because in terms of current accepted psychophysiologic theory it makes no sense, then we have only the course open to us to say that it cannot happen.

The only trouble with this argument is that, as a matter of empirical fact, it does happen! Inserted precisely at the right point, a needle in the foot will effect the human body. By the choice of the correct words the art of healing may be greatly enhanced. By proper question formulization psychophysiologic stress may be formulated to ascertain what appears to be the truth. What should we do about these events, which by all rules, ought not to occur,

but which nevertheless do occur?

Two courses are open to us. We can either shut our eyes to the queer, embarrassing data in hopes that, if we don't look at them they will go away and leave us in peace. Or, alternatively, we can accept them - accept them for the time being as inexplicable anomalies, while doing our best to modify our current theories in such a way that it will "save the appearances" - all the appearances including those queer events that now seem to be outside the pale of explicability.

Herbert Spencer's idea of tragedy was "a beautiful Generalization murdered by an ugly Fact". The author of the this Synthetic Philosophy died many years ago; but as scholastic goals go marching along and the tendency to prefer the high hallowed generalizations of the low, odd, presumptuous datum is still to be met within the most respected scientific circles. From telepathy to acupuncture, from hypnotism to transcendental meditation, from brainwashing, brow beating, and the third degree to sophisticated truth and verification equipment queer facts get ignored by the very people whose business it is to investigate them - get ignored because they fail to fit into all of the academic pigeon holes and do not suffer themselves to be explained in terms of accreditable theories.

"All very fine we are tempted to say, but it still makes no sense." Meanwhile, the fact remains that there are many individuals whose only desires are to get well or to learn the truth and on whom these methods work very well. For the individual whose only desire is to get well or to learn the truth and do it as quickly as possible this is all that matters!

Let us consider for a moment a comparison from history. Picture, if you will, for a moment that you are transported to the little hamlet of Plattsburgh, New York, in the year 1831. An indian trapper whose name is Alexis St. Martin is being examined by his physician, Doctor William Beaumont. The patient has recovered satisfactorily but, by our standards, not totally. He has, what in that day and age was extremely unusual, a hole from the outside world into his stomach which allowed visualization of the stomach. Most persons would have considered this a tragic disaster and a travesty of fate... not so, William Beaumont! Here, at last, was the perfect opportunity for Doctor Beaumont to study the digestive processes in the stomach.

For several years Doctor Beaumont examined Alexis St. Martin daily. He meticulously recorded the digestive process as seen in the stomach. The culmination was Observations On Gastric Juice And The Physiology Of The Digestion which was published in 1833. This paper remains today the first accurate description of stomach physiology. But.....

A man ahead of his time, Doctor Beaumont meticulously collected gastric juices and sent them to the leading chemist of this era for chemical analysis. Count Rumford, the Linis Pauling of that time, carefully examined the material and reduced it to ash - the accepted method for inorganic chemistry - and determined this valuable material comprised only basic inorganic compounds. What good could they be? What rubbish!

It remained for almost half a century before Doctor Beaumont's observations were reconfirmed and his place in history was permanently established.

We, today, have a moral commitment to keep an open mind and not subject any new concepts to obscurity just because they are new.

To illustrate further how emotions can and do effect the bodily physiology we have only to search the literature and again we find the story of Tom. He was an orderly in a New York hospital. As before, he had an opening between his stomach and the outside world (gastric fistula). His immortal contributions to current physiology lay in the in-depth study carried out on the effect of his emotions on his gastric mucous membrane.

By proper psychologic test structure his emotions could by gauged by the color of the mucous membrane of his stomach. This was a crude yet sensitive measure of his emotions that could be utilized in truth and deception. The term "white with rage" was established by the blanching of Tom's mucosa during the emotion of severe rage.

This observation technique may today even be more exact than the subtle changes of the polygraph.

AN INVESTIGATION INTO THE HISTORY OF THE POLYGRAPH

We should perhaps explore some history, and some law with regard to the polygraph and other modes of detection of psycho-physiologic stress.

Since the invention of the Keeler Polygraph in 1926, there have been few if any improvements in the standard kymograph type of polygraph. It is a well known fact that the American Polygraph Association (APA) though filled with men of integrity, has endeavored to formulate truth evaluation into an exact science; but, it remains as of this date and time, an art! The courts have laid down in the Frey Decision (Frey vs. the United States Government; 293 F. 1013, 1014) reasoning that was basically sound; and, since that time repeated cases have reinforced the same arguments. It should be noted at this point that Frey was convicted of murder and sent to prison for life but three years later someone else confessed to the crime and he was liberated. The Frey decision is very short and is worthy of every person's study and attention.

In the case of the People vs. Davis the courts called attention to the co-published work by Professor Fred Inbau and Mr. John Reid. It quoted from the third edition of their book published in 1953 entitled Lie Detection and Criminal Interrogation and I quote as follows:

> *'Until the previously estimated accuracy is generally attainable, and a much higher degree of standardization achieved, the courts should continue to withhold the sanction of the lie-detector results. (p. 128)*

> 'The present lie-detector technique is not adequately standardized as to the instrumentation or the manner in which the test should be conducted, or the interpretation of the recordings. (p. 129)
> 'It must be reported, therefore, that at the present time the technique is not an "accepted" one among scientists whose approval is a prerequisite to judicial recognition.'" (P. 130) People vs. Davis 343 Michigan 348.

It should be further noted that these authors are still accepted authorities today. In all fairness it further should be noted that one of these authors has changed his position.

It is noted that the court did not condemn the polygraph as unsound but simply postponed the date that it could be utilized as evidence. Why has it waited so long?

In the pleadings of Mr. F. Lee Bailey in a presentation to the Supreme Court of the State of Michigan as the plaintiff - appellee vs. Peter N. Lazaro as the defendent - Appellant, Mr. Baile quotes from Doctor Lemoyne E. Snyder as follows:

> "The next question is apt to be, 'Is the machine infallible?' That question is exactly like asking whether a clinical thermometer, stethoscope, X ray machine or compound microscope is infallible. A trained scientist may be mistaken in what he sees or hears by any of these devices. Like the thermometer and stethoscope the polygraph is simply an

instrument for noting or recording the physiological processes and it is possible for the operator to be mistaken in his interpretation of these recordings. Even in the best clinics an interpretation is not 100 per cent accurate, but that does not imply that the machine itself should not be used. The same can be said for the polygraph." (15 Rocky Mtn. Law Review 162 (1943))

I would like to state in passing that Doctor Snyder obtained the first forensic polygraph utilized in the State of Michigan by the Michigan State Police.

In the same brief Mr. Bailey pointed out that in 1953 Dean Wicker had surveyed the polygraph field and reported the following:

"Mr. Inbau, a leading authority in the field, conservatively estimates that the diagnosis of 75 to 80 per cent of the polygrams made by the Chicago Scientific Crime Detection Laboratory are correct. These polygrams cover a period of 16 years and involve several thousand examinations. However, Mr. Inbau explains that the estimate does not signify that there is a 20 to 25 per cent margin of error. It merely indicates that the polygrams of 15 to 20 per cent are too indefinite to justify a cautious examiner in making any diagnosis. The remaining 5 per cent constitute the margin of maximum probable error."

Mr. Lynn Marcy of Dearborn, Michigan, a most respected; conscientious; cheerful; law abiding polygraph examiner; and a man of honor; integrity; and sound judgement stated before a Florida meeting of physicians; attorneys; judges; and police officers that in his competent hands in reviewing over 8,000 of his cases that an accuracy rate of 92 per cent were conclusive and per cent were inconclusive with a 1 per cent margin of error.

In no decisions have the courts held or maintained that either one, two, or three leads are necessary or should be used to establish or verify truth. Machines with up to 32 channels have been developed but very little improvement in accuracy has resulted.

The American Polygraph Association through conscious endeavor, and by stringent regulations has tried to convert an art into a science. This, they will never do! Even with continued efforts on the part of the American Polygraph Association, the courts have constantly and consistently failed to recognize this modality as an exact science. Why? Now we find some states trying to legislate a science where no science exists!

In 47 years no definitive and advancing improvements have actually been made in the forensic polygraph. People, careful scientific men, deeply dedicated legal individuals, sincere investigators, and all moral individuals of good judgement, realizing the limitations and short comings of the polygraph and fully cognizant of the zest and fervor of a few exponants of the forensic polygraph have seized upon the recently discovered or rather rediscovered micro-

uscle tremor as first discribed by Halliday and Redfearn in 1956 nd reviewed and reevaluated by Lippold in 1971 as another more exact and more precise method to establish psycho-physiologic stress.

The PSE-1 (Dektor) and its new model the PSE-101 (Dektor), s you are well aware, utilizes the micro-muscle tremor as one of ts modalities to help establish and evaluate psychophysiologic tress in properly established and carefully thought out tests for he purpose of evaluating truth and deception. At this point it hould be pointed out, and I think continually pointed out, that one of these instruments, whether it be the forensic polygraph r any of the Dektor models measures anything more than psycho- ysiologic stress.

However, the Dektor instruments (both the PSE-1 and the PSE-101) ave also, by means of the voice what can be assumed to be a pneumo- raph lead, and a cardiograph lead as would be found in the conven- ional polygram. In addition to these two leads there is the icro-muscle tremor lead, alpha frequency lead, the wave analysis lead, and the wave analysis lead including the pulse.

All in all the Dektor machine (the PSE-1 and the PSE-101) combine the best features of the polygraph and add new and current modalities which are vastly more important in establishing psycho- logic stress. Furthermore, whereas the forensic polygraph requires sensor attachments to the individual the Dektor instruments require no sensor attachments.

It is amazing that in none of the discussions of the forensic olygraph have there ever been discussions of the forensic poly- raph as a unit system and particularly a three part system composed o

1. An examiner
2. An instrument
3. An examinee.

There has been no discussion over the interrelationship of the parts of the system. Perhaps the stable portion of the polygraph system is the instrumentation. No interreaction is ever presented about the reaction of the examiner to the examinee, the reaction of the examinee to the examiner, the reaction of the examinee to the instrument, or the reaction of the examiner to the instrument.

In my way of thinking these are but a few of the gross, glaring, unjust shortcomings of what is known as the forensic polygraph system. Another difficulty in the use of the forensic polygraph is the unknown state of consciousness of the examinee; i.e. whether he or she is in the beta state, alpha state, theta state, or delta state; for, the test results do depend to a large extent on this knowledge; and I know of no way for the examiner to determine, as of this time, other than by direct observation the status and level of consciousness of the examinee.

It is often asked about the forensic polygraph, "can the examiner affect the results of the test?" The answer is an unequivocal yes! He can by manipulation of the dials, by interrelationship between examiner and examinee definitely create stress which will show up in the printed polygram record which has no bearing on the questions asked. This is a decryable situation.

The Dektor instrument (the PSE-1 and the PSE-101) is a four-part system and has been deliberately designed as a four-part system. The four parts consist of:

1. An examiner
2. A tape recorder
3. An examinee
4. The PSE itself.

It is not possible to utilize all portions of the system simultaneously. The examiner and the examinee's interrelationship are recorded on a tape recorder and an actual verbatum transcript of the examination is obtained. This verbatum transcript should include the following:

1. A complete discussion of the examinee's rights.
2. The miranda rights if it is indicated.
3. The fact that the examinee understands his rights.
4. A complete recording of the pretest interview.
5. A recording of the question formulation.
6. A recording of the actual test situation.
7. A recording of the post-test interview.
8. A recording of any other conversation.
9. A total recording of the number of people present and witnessing the examination.

I should add at this point that it is possible in the PSE system to have people in the room whereas in the polygraph system a quiet, closed room is important.

Only after these three parts of the system have interreacted can the material from the tape recorder be fed into the PSE system. The PSE system gives a printout which is possible in 32 different modes or potentials. By utilization of some or all of these modes,

various stress patterns can be achieved.

More important, is that these tape recordings may be sent to other examiners, with other PDS instruments and may be run on these instruments so that second evaluations may be undertaken. It is not necessary to run or to send the original copy to the second examiner for they can and should make their own copies. In the forensic polygraph system, the original printout is the only thing that can be sent to another examiner.

Lastly, and of increasing importance is the fact that any number of tests may be run. The forensic polygraph has a limit on testing because of the time factor that you can allow a blood pressure cuff to be held between the systolic and diastolic blood pressure reading. There is no occasion where two people cannot sit and converse.

I have had occasion to have recordings sent to me, via telephone, from the Newark, New Jersey, Police Department and the New York City Port of Authority Police for second opinions. (Copies of these may be submitted as evidence).

Charges have been made in a "White Paper" submitted without a heading (I should be glad for the committee to make a copy of this but I must obtain the original) that:

"The Dektor Training Course is too short!"

The course does not proport to make an examiner. It only teaches people how to read stress reactions in charts. I respectfully submit that a two-day course, a week course, a six-week course, a twelve-week course, a fourteen-week course or even a twenty-week course such has been given at times at Fort Gordon does not create an examiner. Examiners are made only with training, experience,

and a certain intangible intuition. Not everybody possesses this intuition and not everybody can learn to achieve this intuition.

In my 18 years of medical practice each new patient is an unknown quantity, and I must reassess continually my abilities as an examiner or physician, if you will, to carefully scrutinize my abilities with each passing day. Reeducation is a constant necessity.

Another charge that is made is that the Psychologic Stress Evaluator (PSE-1 or the PSE-101) can and may be used in a clandestine fashion. It is true that tape recordings may be run in a clandestine fashion, in a face-to-face conversation, off the radio, off the telephone, and off the television. However, without formal testing situations and structure the only evaluation that you can achieve from these tests is that the individual you are talking to is stressing or they are not stressing. From this type of recording no type of truth evaluation could be undertaken. If a person is speaking with great emotion or conviction, the recording will show stress, as it should, mirroring that emotion or conviction.

In all fairness to those persons possessing a higher I.Q. (boardering on the superior intellect or subgenius level) and living almost in a total beta state it is much more fair and much more exact to run a covert test when the person is relaxed and does not know that they are being tested. Since early childhood we have been learned to stress in testing situations. The higher the intellect the greater the stress. I submit to you that this need not be done with hidden microphones or hidden cameras, but it may be done in a completely open and overt manner if the examiner is well trained in the school of psychophysiology. I would further submit to you that the same thing is done with the polygraph although the polygraph people say that this is not so.

Rather than rebutting each of the anonymous "White Paper" charges I will be glad to answer questions from the committee or the staff about them at the conclusion of this presentation.

As I have previously stated, in 47 years there have been no innovations and there have been no revolutionary trends in the polygraph, so are we to say that we should stay with the best 1900 modality (similar to the horse and buggy) or should we not update our thinking and allow for the inclusion of the more scientific, more exact, less stressful, micro-muscle tremor - a tool that would be destined for 1984 but a tool with which we are able to use in 1973. With the energy crisis should we stick to the gas guzzling engine or should we not look for a new modality to further conserve energy. I do not propose that we return to the horse and buggy. Should we not utilize any modality which helps to substantiate psychophysiologic stress, and is it not for the scientist to determine whether psychophysiologic stress as determined by newer modalities is not a better indication for the verification of the truth?

For completeness you should know that there are certain persons who should not have a forensic polygraph examination. Those are individuals who have:

1. Excessive fatigue
2. Prolonged interrogation
3. Physical abuse
4. Evidence of drugs, especially tranquilizers and stimulants

5. *Subshock or adrenal exhaustion*
6. *Excessively high or low blood pressure*
7. *Heart disease*
8. *Respiratory disorders*
9. *Psychoses.*

No such limitation is placed on the use of the Psychologic Stress Evaluator. After all you simply have two people discussing without any physical attachments the problems and you have a tape recording being made. It should be agreed and stipulated by anyones physician that this is an allowable situation. Most recently a man who had had two open heart operations was told by his physician that he could not have a polygraph examination, but the physician readily said that he could have a Psychologic Stress Evaluation examination. I believe in this case the fact speaks for itself - Res ipsa loquitur.

In an effort to bring you up to date to the last court decision regarding the introduction of the forensic polygraph into court, I would refer you to the case of the United States of America vs. Errol Zeiger. This was presented in the United States District Court, District of Columbia on 10 October 1972. The question arose as to whether to admit the testimony of Lieutenant Shoop as a polygraph expert. To my knowledge this is the first time the court looked at the forensic polygraph as a three-part system. I quote from the court record:

> *"Just when a scientific principle or discovery crosses the line between the experimental and demonstrable*

stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

We think the systolic blood pressure deception test has not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the courts in admitting the testimony deduced from the discovery, development, and experiments thus far made. This is a reaffirmation of the Frye decision.

However, this court opined that each polygraph expert should be examined on his own abilities, knowledge, and expertise. In the final analysis, the determination of whether the proffer of polygraph testimony can be presented so that it is of value to the truth - finding process overcomes the danger of over-emphasis by the jury and resides within the sound descretion of the trial judge. The court should insure that the jury has been adequately prepared before it allows the examiner to state its conclusions. If these safeguards have been observed, the jury should be able to properly evaluate the polygraph evidence.

The task of educating and instructing the jury may consume considerable time and perhaps encumber it with auxiliary and complex matters. Such burdens on the judicial process must flow to some extent from a decision to accept forensic polygraph testimony. The Court has carefully observed the comprehensibility and compressibility of the expert testimony in the course of the hearings before it and it is of the opinion that the effects of these factors can be minimized at trial. The conclusion which the Court reaches is that the proffer of polygraph testimony here is both compatible with the system of trial by jury and is possessed of a demonstrated evidential force which strikes the balance in favor of its admission.

Accordingly, the Court holds that on the facts of this case, the requirements for the admission of expert testimony based on the results of the defendant's polygraph examination, as mandated by Frye and by the general rules of evidence, have been satisfied.

It is so ordered that the proferred testimony of Lieutenant Hamilton W. Shoop should be admitted at the trial proceeding."

In essence the court stated that the jury system would not be set aside by the use of the polygraph and that the polygraph should be admitted only after careful examination of the polygrapher to his abilities.

It is regrettable that this monumental [illegible] enlightenment was overturned by the District of Columbia Court of Appeals; Judges McGowan, MacKinnon, and Wald presiding. Unfortunately, and deeply regrettable is the fact that they gave no reason for their decision.

The temper of the courts is in the wind! The thinking in the case of the United States of America versus Errol Zeiper was clear and concise. I believe that it is only a matter of time until this thinking and ideology reappears and becomes firmly established as part of our judicial system.

As long as nothing interferes with the adversary system and evaluation by a jury of our peers, then all types of instruments measuring stress will become a part of the judicial process as long as they lend themselves to the adversary system.

Irrespective of the new modalities, and I think that you should be aware there are other instrumentations besides the Dektor PSE-1 and the PSE-101, the establishment and the verification of truth is still an art! It always will remain an art; as is the art of medicine, because the final determination is not made by a machine that lights up, or buzzes, or blows apart; but, it is made by an individual; and there has been no individual on earth, save one, who was infallible. The courts will have to establish whether they desire to use these new modalities or not. We know, that the instrumentation and the interpretation by qualified experts in the PSE-1 and the PSE-101 have been used by stipulation in the states of Maryland and in Louisiana. It is more acceptable than the forensic polygraph because the same recording can be run on various instruments at a time remote and separate from the original examination, and reproducible results will be obtained. In short, this instrumentation lends itself beautifully to the adversary system.*

It is never easy to be ahead of your time and, as Allan Ashley-Pitt has stated, "The man who follows the crowd will usually get no further than the crowd. The man who walks alone is likely to find himself in places no one has ever been before."

Creativity in living is not without its attendant difficulties for peculiarity (the PSE-1 and PSE-101) breeds contempt and the unfortunate thing about being ahead of your time (ahead of the APA) is that when people finally realize you are right they say it was obvious all along.

**And other states as of the time of this writing.*

You have two choices to make. You can dissolve into the main stream, or you can be distinct. To be distinct, you must be different! To be different you must strive to be what no one else but you can be.

IS THE MICRO-MUSCLE TREMOR USABLE

With the appearance of Lippold's classic monograph in 1971 discussing, as it does, the physiological muscle tremor or the micro-muscle tremor that occurs in all striated (skeletal) muscles, it is inevitable that careful investigators should seek to retrieve these micro-muscle tremors from the voice. Bell, Ford, and McQuiston searching for a new polygraph channel have been able to accomplish this result. Although their work is somewhat empirical, it is of monumental importance.

It is clearly apparent and totally proper for those individuals who utilize the voice as their modality of expertise to become thoroughly acquainted with the micro-muscle tremor. It is also proper for them to seek innovations and utilizations of these tremors and to explain further their significance.

Though the existence of the micro-muscle tremor has been known since 1956 by applying the technique of Fourier analysis, the more exact physiology awaited the Lippold monograph.

For those unfamiliar with the micro-muscle tremor it is necessary to explain that muscle fasciculations (or ripples) occur in the alpha range (8 to 14 cycles per second), and they encompass 1 per cent to 2 per cent of the total contraction length of the muscle and/or muscles. Lippold postulates, "that these

tremors are both frequency modulated and amplitude modulated." He believes that they constitute a servomechanism designed to dampen muscular activity, or in the quiescent state to prepare the muscle for ready activity. It is not the purpose or the intention of this dissertation to explain or to seek the origins of these tremors.

Lippold states:

> "We must first be clear about exactly what is meant by physiologic tremor. Tremor in muscle can be produced by a great variety of stimuli: The beating of the pulse, the general movements of a number of muscles, the blood pressure, even vibrations created by passing traffic. In identifying and examining normal physiologic tremor, however, we are concerned specifically with the ripple that is superimposed on the voluntary contraction of a particular muscle and arises solely from this activity."

Clearly, the important axiom is that the micro-muscle tremor is superimposed upon voluntary contraction. Here then the micro-muscle tremor manifests its greatest significance. If it is found in all voluntary, striated musculature, then the micro-muscle tremor itself is a ripple or contraction superimposed on top of the normal muscle action; and the micro-muscle tremor should be recoverable from the human voice as the human voice is formed by cavities of striated muscles. Bell, Ford, and McQuiston utilizing electronic filtering and frequency discrimination techniques have been able to do just this. They have isolated the micro-muscle tremor from the human voice! These tremors may also be

isolated from other animals that emit sound. I would be glad to demonstrate the emission of a happy playful whale and that of a mating whale. They are distinctly different.

Bell, Ford, and McQuiston found that in the normal, unstressed, voluntary spoken voice the physiological tremor (micro-muscle tremor) is present. With their instrumentation (Dektor PSE-1 and PSE-101) they can reproducibly retrieve the micro-muscle tremor from the spoken voice of any individual. Figure 1 (and I will submit figure 1 in all 32 modes) shows the word "yes" revealing the format frequencies, alpha frequencies, pneumograph interpretations with the superimposed micro-muscle tremor. These wave forms are both amplitude modulated and frequency modulated. They appear, in mode III and IV, very much like an untrimmed hedge.

Returning to the works of Halliday and Reifearn and later to the works of Lippold, these retrievable micro-muscle tremors that exist in the spoken voice attain gigantic significance. Now they are usable! Now they may be used, with proper test formulation in understand psychophysiologic stress. No effort is made in this dissertation to explain the origin of the micro-muscle tremor. Since much of this theory readily falls into the realm of conjecture and speculation, it will suffice to demonstrate that their retrievability and reproducibility exists; and their existence has been demonstrated. It must be reemphasized that Lippold has indicated clearly that these physiologic tremors and their existence do fall into the alpha range between 8 and 14 cycles per second and do amount to 1/100th to 1/100ths of the total contraction length of the muscle ... 1 per cent to 2 per cent.

Furthermore, Lippold demonstrated that these tremors could be dampened by both extrinsic and intrinsic forces ... the intrinsic forces working through the central nervous system. This, is more interesting! It is of more significance to the general population that the micro-muscle tremor can be dampened by psychophysiologic stress working through the central nervous system. All 3% modes of a person showing psychophysiologic stress will be submitted to the committee. In this instance the psychophysiologic stress is produced by lying.

Much time has been spent in the understanding of the inter-relationship between the micro-muscle tremor, or the lack thereof to psychophysiologic stress; and, at this time, it is apparent that there is a reproducible relationship present. As psycho-physiologic stress increases, the micro-muscle tremor of the voice decreases or disappears.

It is demonstrated that both extrinsic and intrinsic factors ... muscular tension and/or psychophysiologic stress create muscle tension ... will dampen or abolish the micro-muscle tremors. There exists a reciprocal relationship between psychophysiologic stress and the micro-muscle tremor. As psychophysiologic stress increases, the micro-muscle tremor decreases. It is further demonstrated that the instrumentation of Bell, Ford, and McQuiston, the PSE-1 and the PSE-101 will retrieve these tremors from the human voice.

EPILOGUE

As of this time I can see only one concept with certainty.

That is that there are a number of instruments such as the forensic polygraph, the electromyelograph, the electromyelometer, the electroencephalograph, the electrocardiograph, the psychologic stress evaluator called Dektor PSE-1 and Dektor PSE-10, and many other instruments that are capable, when used correctly to measure some parameter of body psychophysiology. By specialized testing techniques some are capable of recording changes in these parameters due to either extrinsic or intrinsic stress. That is all these instruments will accomplish. It has been pointed out that these are three-part systems and four-part systems respectively and we must evaluate each portion of the system.

You find yourselves in a dilemma. What to do? Those instruments requiring bodily attachment certainly do create stress within the examinee and they may legally constitute assault and battery, or at least the practice of medicine without a license. Those not requiring attached sensors may be considered, by some, as an invasion of privacy.

Some of the suggestions that I have for you gentlemen and ladies are:

1. You gentlemen could state that these instruments are medical and should be controlled by The Board of Medical Examiners of this great state. The Board of Medical Examiners is already in existence and they do test examinees for psychology, physiology, and interpersonal relationship. The creation of a new Board seems superfluous since you already have a Board set up to do just this.

c. Since the courts seem to be arriving at the point of acceptance of instruments for the detection of psychophysiologic stress, and, since the courts do seem to be arriving at the true concept that these are three and four part systems, would it not be better to allow the true adversary system and common law to seek the correct answer--however slow that answer may be. It would appear that the courts have been more stringent and more severe in judging the evaluation of these methods and their examiners than they have been in other areas of expertise. Why?

There is a fear that these instruments and their examiners may invalidate the jury system. Now the courts are beginning to feel this is not so.

d. If the forensic polygraph is to be admitted, its accuracy in any qualified examiner's hands must approach 98% or better and be far more adaptable to the adversary system than it is now. We must be able to evaluate all portions of the system--not just the results!

The PSE-1 and the PSE-101 does now! By tape recording it records the entire examination. Furthermore, since the forensic polygraph is more effected by unseen examiner-examinee activity it would be well to require complete audio-video recording of the entire testing procedure showing all activities of the examiner and the examinee and the examiner's utilization of the instrumentation, and in addition require a separate complete recording channel

for the entire interview. Even then we may find that the adversary system does not lend itself to the forensic polygraph as it does to the psychologic stress evaluator (PSE-1 and PSE-101). I further feel that the duplication of the audio channel is necessary as a fail-safe mechanism to guard against any limited deletion of the audio recording.

Furthermore, I do not believe that the forensic polygraph should be used as a wedge to interrogation. It is equivalent and comparable to the use of a black jack, brain washing, and it relies on a sense of fear to illicit a forced confession. <u>This is unacceptable!</u>

It is improper to say that just one device can detect psychophysiologic stress when a proper testing situation is set up. Many can! New ones will be developed and are being developed. If the results are the same, allowances should be made for all. Perhaps the examinee should be allowed to select the system which he feels is the best suited to his needs. His attorney can help him in this selection.

I would like for all of you to feel that this was the beginning of the end. It is not. It is not even the end of the beginning. In this area we find that you are at the beginning of the beginning. Your job is a heavy and odious one. Be careful in your choices and your selections.

SUMMARY OF INFORMATION REGARDING THE DEATH TEST AND ITS EVALUATION WITH REGARDS TO DRUGS

The question has been raised whether any drugs have been tested against the PSE-1 and the PSE-101. Utilizing a standard test which

uses the uniformity of death, drugs have been evaluated by the intravenous route where possible, but some by oral administration.

The test was run first in the conscious and awake state, and then the individual was given a known dosage of drug intravenously. The test was then run again in twenty minutes. Another dose of the drug was given intravenously, and the test was run again. This procedure was carried out until the individual was unable to coordinate due to drowsiness, sleepiness, or the intoxicant effect of the drug.

The following drugs have been evaluated intravenously:

1. Demoral
2. Morphine
3. Atropine
4. Cintropan
5. Adrenalin (not intravenously)
6. Benadryl
7. Nembutal
8. Seconal
9. Amytal
10. Pentothal
11. Brevital
12. Histamine
13. Valium
14. Robaxin

Further drugs are under consideration at this time as time will allow.

Further drugs considered by oral route have been:

1. Ethyl Alcohol
2. Librium

3. Sinequan

4. Trilafon

5. Elavil

6. Triavil

7. Thorazine

8. Sompazine

9. Phenobarbital

10. Sparine (intravenously and orally)

11. Aspirin

12. Phenacetin

13. Caffeine

14. Chloral Hydrate

15. Paraldehyde

In no instances have I found that administration of drugs in therapeutic amounts or in doses up to the point of toxicity or uncooperativeness have made testing with the Psychologic Stress Evaluator worse.

This is a brief summary of a paper to be written.

May I thank you for your attention. I should like to leave you with two quotations--

The first is by Alexander Pope:

"Be not the first by whom the new is tried,

Nor yet the last to lay the old aside!"

And the second which is good advice for all of us is that given by Polonius to Laertes in Shakespeare's Hamlet:

"This above all, to thine own self be true,

And it must follow, as the night, the day,

Thou canst not then be false to any man!"

Recently, Buckminister Fuller has said while writing for the Johns Hopkins Review, "If change is inevitable, then any attempt to stay the change - by holding with a custom that had been so satisfactory yesterday - would build up an obstacle to the change that would bring about possibly the greatest of revolutions."

Is that not what these hearings are all about?

May I thank you very, very much for your kind and considerate attention.

Mr. MOORHEAD. Colonel, do you agree with Dr. Heisse that your system requires well-trained, qualified, and competent individuals?

Mr. MCQUISTON. Yes. Yes, I do.

Mr. MOORHEAD. We had testimony from the Polygraph Association of how much training, of how many class hours of work and so forth. Do you or does the International Society of Stress Analysts have similar requirements?

Mr. MCQUISTON. Similar in length, in terms of length? No, because the system is much more simple than learning to use a polygraph. And we have been somewhat limited in our short life in our ability to offer the comprehensive training program in terms of length of time that the Polygraph Association does which we do not consider a requirement. Our company almost from its inception has required each purchaser of our equipment to complete a company training program before we would sell the instrumentation to them.

As far as we know, we are the only manufacturer making this requirement of our customer population. We will not deliver the equipment until they have completed a formal 3-day orientation course on the equipment. This is not to be compared, though, with the 6 to 8 to 14 weeks of training required on polygraph in our opinion.

Mr. MOORHEAD. I think you stated in your Army experience and counterintelligence experience that you had employed the polygraph machine?

Mr. MCQUISTON. Yes, sir. I have been an examiner since 1960. I am a graduate of the Army's Fort Gordon Polygraph School.

Mr. MOORHEAD. Do you have any figures on the reliability of the results of the Dektor system versus the polygraph or can you describe it in words other than figures?

Mr. MCQUISTON. Yes, sir. We do have statistics. When we received the letter from the committee, we had a short time only to react. That is why we were only able to query 8 percent of our customer population. But in that time, as I stated in my opening remarks, we have the statistics provided to you in this documentation of over 39,000 cases conducted. It is statistically broken out in terms of convictions that followed the examinations in terms of persons who were cleared of suspicion as a result of the examination, and it is broken out in categories, for example, for industrial/commercial users and for specific uses. It is in the documentation.

In regard to the specific statistics pertaining to our PSE system, in regard to the polygraph system, Mr. Chairman, I think I can answer your question from one page of this document and I believe you will find it on table 3 of our tab (c) of this document.

Mr. MOORHEAD. Table 3?

Mr. MCQUISTON. It is 3. There are statistics which address your specific question. These are a number of simultaneous examinations run with the PSE and the polygraph. There were in the same case, in the same investigation, simultaneous recordings made by the polygraph and the PSE in 5,045 cases. In 5,037 of those cases there was exact duplicity of results. They agreed with them in other words. That really puts us down to something like 99.84 percent correlation.

Mr. CORNISH. Mr. Chairman, may I interject at this point?

Mr. MOORHEAD. Yes.

Mr. CORNISH. Were these polygraph tests and PSE tests conducted by the same individual?

Mr. McQuiston. They were in some cases and in some cases they were not. I do not have a breakdown as to the cases when they were or were not. I think some of them were. I would say the majority of them were done by the same individual.

Mr. Cornish. It is often said that the examiner is really the lie detector, and I think maybe this proves that point.

Mr. McQuiston. Many of them that I am aware of were conducted in the blind. Many of that 5,000 I directly participated in were always either one examiner or the other that had no knowledge of the other examination.

In those statistics, and I don't have the exact figure, but there were considerable cases done in the blind by an examiner not having knowledge of the other person testing.

Dr. Heisse. May I say the polygraph system is a three-part system: an examiner, an instrument, and the examinee. The PSE system is a four-part system consisting of the examiner, a tape recorder, an examinee, and an instrument which may or may not be involved at the time of the examination. So, you have interaction, not only between the examiner and the examinee, but you have interaction between the examinee and the examiner; you have interaction between the examinee and the system or the instrument. So that you then get down to the judge's opinion that is quoted on page 16 of this article that I did give you, Mr. Cornish, which said it really isn't the system we are looking at; it is the quality of the individual examiner and his credentials that is going to be important in whether or not we are going to allow this into the judicial system.

Mr. Moorhead. Let me see if I understand about the importance of the examiner to make your system, I mean as opposed to the polygraph, to make your system work. Do you need the same kind of treatment in your system, that is, the relevant question and the irrelevant question and the control question and so on, do you have to have that?

Mr. McQuiston. Yes, sir. I would like to expand on that just a little bit. As far as the tested procedures are concerned, with the PSE it has been stated by other people that the PSE can be used without the consent of the subject as a lie detector. This is untrue. It is not correct. The system, the PSE as a lie detector cannot be used without the knowledge of the individual because detection requires a very specific set of circumstances, which means a personal confrontation, the pretesting of you, the very rigid test of a section of test questions which must be reviewed with the individual prior to the test. The statements in reference to plugging it into your television are simply not correct.

You cannot conduct detection (of deception) surreptitiously. It is impossible with our equipment, to the best of our knowledge, or anyone else's equipment.

Mr. Moorhead. I see. So that I had the idea that as a criminal investigative technique that with proper court authority and so forth you could tap a person's phone—and I don't mean maybe to get evidence that is admissible in court—but just tap it to weed out the innocent so you could focus on the guilty.

Mr. McQuiston. Yes, it will but not as a lie detector. We are not concerned as an aid to investigation in this weeding out process that you refer to in truth or deception. To give an example, as happens in many cases of 18 suspects to a major felony, the investigators can talk

to those people and they can record the statements that are made. Those statements can be analyzed by the equipment in terms of psychological and physiological stress. Based on the stress that is displayed by certain individuals, the investigators may assume that certain individuals do not have a sufficient stress level to be involved with a particular specific situation. In that case they would focus their attention on those who did appear to have an emotional involvement with that particular crime. That is where their investigation would begin but it may not end there.

Mr. MOORHEAD. That is interesting. How would that require the skilled examiner or could you measure, from conversations with friends and acquaintances discussing the particular felony, could you measure the stress so that there would be a stress level that would weed out the innocent?

Mr. MCQUISTON. Dr. Heisse?

Dr. HEISSE. I would like to address myself on this because I have done some work on conversations. It is extremely tedious! We are here in Washington where there are tapes under consideration, and it takes me roughly 2 days to do a 20-minute tape to get the information you want of the different stress levels of different individuals. Then all I have then is a tape that says we have different stress levels of different individuals. They may normally have that stress level. They may speak with emotion. They may speak intensely while someone else may be slow and lethargic in their approach. This means nothing more than a stress level.

Mr. MCQUISTON. From which certain inferences may be made by an investigator to allow him to begin a focus on his investigation. Certainly the company nor none of the customers support the idea that any PSE charts are prima facie. They are not. They are simply a beginning as one tool we may use in an investigation to give focus and direction to our investigation. There are many reasons that a person will show this stress level. First of all, his inherent level, his normal stress level, his inherent level. We have to know that as a base ground truth before we begin our analyses. Certain elevation of the stress level could be caused by many things. If we were to conduct an interview over the telephone, we do not control the distal end of that conversation. Any emotional involvement at the other end may show a stress level, which would be an indication of so-called guilt but this is not true. We have to reason it out in terms of the person's normal behavior and the fact that we cannot guarantee that his particular stress to a particular question was not caused by some outside stimulus. This has to be taken into consideration.

Dr. HEISSE. The colonel has mentioned that it not only applies to the human but to many other animals. We have done some interesting work on whales, both playful and mating. And when you are dealing with the opposite sex, you have a problem. Obviously, it is stressful in the world population. So we could read these charts only from the standpoint that there was more stress in one type of whale than a playful whale.

Mr. MOORHEAD. I would think that a skilled operator listening to an individual, with the individual not knowing about it, and hearing the individual ordering the groceries one time or talking about a business deal another, could pretty well chart that individual's normal

stress level, and therefore when the subject came up which was the subject of the investigation, they could make a pretty good guess.

Mr. McQuiston. Without instrumentation?

Mr. Moorhead. No, with.

Mr. McQuiston. With instrumentation? It is just that, sir; it is a guess. It is a point to begin with. If you examine 18 suspects to a crime, and 2 or 3 of those suspects show abnormal stress, then it is a beginning. We may assume in that investigation, for the purpose of saving man-hours, that those three individuals may be involved. That may be the cause of their elevated stress. It is a beginning. It has been quite successful in police departments with this approach. They have been very successful with it in terms of eliminating immediately certain persons from suspicion and proceeding to gather hard evidence in the form of other investigative aids like surveillance, records, checks, and all of these which are the tools of law enforcement. This is simply one tool in the toolbox. Taken in proper perspective, it is a good tool. I think you will find in this document many statements that are made in reference to the use of systems as an investigative aid in the accompanying statistics from various police departments and agencies. In no case is the examination as a lie detector ever administered without the consent, the full knowledge, and all of the appropriate review and controls given to that individual with a signed witness waiver and release form before the test is conducted as a lie detector test. As a stress evaluator, it is simply a tool to try to give the case direction. That is all. It can prove nothing. It is not evidence. It simply is a case lead.

Mr. Moorhead. Is the Federal Government one of your customers?

Mr. McQuiston. Yes, sir.

Mr. Moorhead. Have you supplied for us the number of instruments that you have sold to the Government?

Mr. McQuiston. I don't believe those statistics are in this report, are they? What was our count? Mr. Chairman, nine [1] units have been sold in our total history to the Federal Government.

Mr. Moorhead. Can you supply for the record the different departments or agencies?

Mr. McQuiston. Sir, in regard to our surveying customers, many of them are on a confidential list, and we have agreed to protect them as proprietary, so in that particular case, if they are available, certainly we would have to be required by a subpena to give those; otherwise, we would be breaking a confidence with our customers to supply those. Many of the agencies in the Federal Government—well, not many but some of them—have requested immunity. But I am not reticent to release those. Most of those instruments if not all are used for research areas and——

Mr. Cornish. We have accounted for six, and they are all within one department. You used the plural like you were talking about a number of agencies.

Mr. McQuiston. Yes, sir, I am.

Mr. Cornish. I would assume that the other three are other agencies?

Mr. McQuiston. I don't know which six you accounted for, but since you already know those, I imagine giving you the other three is no great breach of confidence. The majority of those were also sold, I

[1] This number was later corrected to 11.

would say, in our first year. Our company is just 4 years old. At that particular time—and it was my understanding, indeed our information, that they were being used in research projects—and since that time, our sales to the Federal Government have been practically nonexistent.

Mr. CORNISH. Well, the six, as I understand it, were purchased by the Department of Defense. Now, what other departments or agencies have purchased from you?

Mr. MCQUISTON. The National Security Agency.

Mr. CORNISH. Is that the only other one?

Mr. MCQUISTON. Well, you are counting the Department of the Army and Air Force and all of those as just the Department of Defense. So within the Department of Defense, plus the National Security Agency, I think that would be it, sir. I didn't break them down. I consider the Air Force, Army, Navy, naturally as independent. Within the Department of Defense plus the National Security Agency, yes, that way you have them all. Oh, and one VA hospital purchased one. That would be another one.

Mr. MOORHEAD. Do you want to proceed, Mr. Cornish?

Mr. CORNISH. No, that is all.

Mr. MOORHEAD. Mr. Daniels?

Mr. DANIELS. Colonel, in looking at the table which you have directed us to in the presentation you have made to the subcommittee, I am struck by how absolutely consistent the results of the polygraph seem to be to the results of the PSE. Now, knowing that the polygraph itself is not 100 percent reliable and that two different examiners might examine the same person with the same machine and get two different results, I'm curious as to how your results could be so certain that in one case, 3,600 people were tested with each instrument and the result was the same.

Mr. MCQUISTON. There may be a possibility, as Mr. Cornish pointed out, that there is examiner contamination in reading both systems. That is a possibility; however, these are statistics obtained from our clients, and I am not able to break that out. Both instruments are medical instruments. They are fine instruments. They function exactly as they are supposed to function. I think you might bear in mind that so-called detection, which is a complete misnomer, but as a common denominator, "lie detection" is 50 percent art and 50 percent science, and you cannot have perfect artwork.

Mr. DANIELS. Yes; that is the assumption I made in wondering about the perfect correlation between the two tests.

Mr. MCQUISTON. I cannot directly answer your question. I can only say that those are the statistics sent to us.

And I can tell you I have participated in many of these stress reading programs in the blind where I have either interpreted the polygraph charts and the other examiner has interpreted the PSE or vice versa, and I am also amazed at the correlation between the two instruments. When stress is involved, the polygraph will most certainly portray that stress on its polygram. When stress is involved through a particular degree, it most certainly will be on our strip chart from the PSE. I have seen it thousands of times.

Mr. CORNISH. What——

Mr. DANIELS. I would be happy to yield.

Mr. CORNISH. That is the only thing you are measuring. The polygraph and PSE are measuring physical stress.

Mr. MCQUISTON. That is correct.

Dr. HEISSE. I would like to correct that. Psychological distress. There is a big difference here.

Mr. CORNISH. All right. We have to use a little verbal shorthand every once in a while, Doctor.

Dr. HEISSE. I think that was eloquently summed up by Lemoyne Snyder when he said in a statement in Michigan: "The next question is apt to be, 'is the machine infallible?' That question is exactly like asking whether a clinical thermometer, stethoscope, X-ray machine, or compound microscope is infallible. A trained scientist may be mistaken in what he sees or hears by any of these devices."

Mr. MOORHEAD. Isn't the polygraph by definition more accurate because it is many graphs and you have just one?

Mr. MCQUISTON. Do you want me to answer that or do you want to?

Dr. HEISSE. You can start and I will finish.

Mr. MCQUISTON. The most sophisticated polygraph that has ever been assembled to my knowledge is 32 channels. There are 32 channels of information on the PSE. It has a single stylus; however, the electronic mode combinations allow 32 separate individual charts to be made from every recorded statement. On my toughest criminal case I have never used more than 4 of these 32 to reach a conclusion. To my knowledge, I have never miscalled a PSE chart. I have miscalled a polygraph chart.

Dr. HEISSE. Now, can I finish up?

Mr. MOORHEAD. Yes.

Dr. HEISSE. The PSE has an expiratory pneumogram. It is like a channel of the polygraph. The PSE does measure the muscle microtremor, which was only postulated in 1956, established in 1971, demonstrated in 1970 before they knew what they were demonstrating by Colonel McQuiston and finally found out what they were demonstrating in 1971. You can, on occasion, get a cardio reading out of the PSE tracings out of what is in the voice and in the throat.

Mr. DANIELS. I just have a couple more brief questions. First, we have been cited the study by Doctor Kubis as to the relative reliability of the two different types of instruments. Do you know of any other scientific studies that have been done on this subject?

Mr. MCQUISTON. Yes, sir. They have been provided to you and if you will look at tab (d) there is an analysis of the voice by Alan Smith, Department of Psychology, Powick Hospital, in Worchester, England. Tab (e) is a study from Malcolm Brenner, Ohio State University, "Stagefright and Steven's Law." Tab (b) is the "Psychological Stress Evaluator," a study by Michael P. Kradz, a police officer. Tab (f) is an abstract of a paper presented to the Acoustical Society of America, Los Angeles, by Gordan H. Barland of the Department of Psychology of the University of Utah. Tab (g) is "An Early Validation Study With the Psychological Stress Evaluator," James W. Worth and Bernard J. Lewis, Washington and Lee University, Lexington, Va. And finally at tab (h) you will find the "Kubis Study," at tab (i) you will find another study entitled "The Kubis Report of 1973: An Invalid Study, a Critical Analysis by Dektor." Have I covered all of the tabs and the studies available now? Oh, and tab (j) is a "Review of Psycholog-

ical Stress Evaluator Validity Studies," prepared for the Foreign Operations and Government Information Subcommittee by my company.

Mr. DANIELS. Who prepared all of these summaries?

Mr. MCQUISTON. The summaries were prepared by our personnel.

Dr. HEISSE. By and large, I would like to interject, most of them are not summaries. Most of them are the entire papers.

Mr. DANIELS. Just one last question. Without divulging any sort of commercial secret, could you tell us roughly what is the price differential between a polygraph instrument and a PSE?

Mr. MCQUISTON. I do not have the current price list for the polygraph. It is my understanding a standard three-pen instrument can be obtained for approximately $2,000. I don't know. That is my understanding at the present time. The Dektor instrument is $3,695, which includes the mandatory company training period.

Mr. DANIELS. Thank you very much.

Dr. HEISSE. Could I conclude our remarks by calling attention to this book entitled "Crime in America; Its Cause and Cures." It says in the first sentence: "Darkness empties the streets within a mile of the White House and the Capitol every evening. Heavy iron bars cover the first floor windows of houses within a few blocks of our Nation's Capitol." This quotation is from the FBI statistics. Mr. Chairman, that there is a serious crime every 5.5 seconds, 20 percent of which are solved. In 1970 loss from minor crimes was estimated at $51 million. Crime is America's biggest industry. From 1960 to 1971 property crime alone jumped 196 percent. That is staggering, gentlemen.

Mr. MCQUISTON. And of course with this——

Mr. MOORHEAD. I am surprised the FBI isn't one of your customers that you have listed here.

Mr. MCQUISTON. Well, this brings up another particular discussion in regard to the Kubis report, which we have analyzed as a scientific document and I think adequately rebutted. That Kubis report was disseminated, it is my understanding, to the field agencies of the Federal Bureau of Investigation and they are not one of Dektor's customers. That is one of the reasons, one of the things that we have had to incur because of the Kubis report and its release. I don't want to take up time on it now but this is just one of the battles, one of the discussions that we have had to participate in. When you venture off a beaten path and you try to put something new in front of mankind, you better be prepared for a very rough road. We have had it. Yet we have survived. As a business we have survived, and the equipment has survived.

In its perspective, it is an investigative tool of enormous value to police and security. It has enormous potential in the medical field. We have trained psychiatrists to use this equipment and measurably reduce their time of analysis of a particular patient. Again, in its perspective it is a valuable tool. To deny that tool because of a general assertion that it could be misused is just not right. Everything can be misused. You will have to adopt the mortality of the user.

It is true that PSE represents a threat in the wrong hands. There is no question about that. We would hope with adequate licensing laws which we have been fighting to obtain, we would hope through expansion (as occurred in the State of Florida which is my district), to offer a more comprehensive training course which we did immedi-

ately as a result of public hearings in the State of Florida on this instrumentation—and I hope that very soon Florida will be the first State to license PSE examiners—through this proper licensing and control with a watchdog eye, we would hope to see that it is not misused. We can't guarantee that by passing a law. Obviously people are assassinated every day even where there is a strict gun control law. We don't propose that it is without fault. In the hands of an improper user, it is a dangerous weapon. But Mr. Erlenborn has summed it up quite well in his portion of the dissenting document to the earlier reports. So don't delay this equipment to law enforcement, to the Federal Government. The polygraph and the PSE are extremely valuable and in their perspective they do represent one of the best tools that law enforcement has today to contain this disease that is sweeping through our society.

Dr. HEISSE. And if I might go right from there into the medical applications?

You could include in this study and in this testimony the electromyograph, the electroencephalograph, the electrocardiograph, any instrument that is used in medicine today can in some way be used as a lie detector or a detector of truth and deception providing you set up strict criteria and pretest interviews and a test structure and a posttest interview. I could do the same thing watching your EKG and yet nobody's going to question whether I have that right or not. One of the gentlemen, and I don't remember which one, posed the question: will legislation solve the problem? Let me tell you, gentlemen, legislation hasn't solved the problem with doctors and lawyers. I am being sued for slander and libel by the same person (and I understand they are different crimes) simply because I reported a fellow physician to the medical examiners and he was found guilty and so he is still after me and he is still practicing medicine. So legislation isn't always the answer.

Mr. MOORHEAD. I don't think that even those of us who deal in the business of practicing law would say legislation is the only answer. We do try in this subcommittee and I think in most other committees of the Congress to get a variety of views. I think we have seen a variety of views presented today. This is our way to try to sort out the truth, to get a variety of different proposals. We invited Dr. Kubis, who has declined our invitation to come here and testify. Mr. Cornish?

Mr. CORNISH. Yes; thank you. Colonel McQuiston, you brought up one of the key questions in this whole thing when you mentioned the high crime rate. It certainly is a problem and we are all concerned about it. I read with great interest your section on morality and necessity. Are you the author of that?

Mr. MCQUISTON. No; I participated in it. I am not the complete author. This is a company document. It was put together by our personnel.

Mr. CORNISH. Well, I found some very interesting statements in it and I will tell you one of the things that bothers the committee is the statement contained in your own section on morality and necessity in which you said, "The individual has the right to prove himself innocent of a crime." Now what we wonder and what we are afraid of is that more and more in our society it is becoming necessary to prove that you are innocent or that you are trustworthy. My under-

standing of our system has always been the reverse, you know, that people are proven guilty. They don't have to prove their innocence. Even where you make the statement:

> However, an individual does not have the right to interfere with another's rights, whether that be one person or a society as a whole.

I think that is an inaccurate statement because, for example, take the case of picketing, which at one time was unconstitutional in the United States. It was finally upheld as a constitutional right in this country even though it interfered with other people's rights, interfered with property owners' rights, and employer rights to conduct business and that sort of thing. And if I recall the ruling in that case, the majority opinion was that it was better to have too much freedom than too little. I think that is one of the major concerns that we have in this country today. I personally will opt for the too much freedom rather than the too little. Now when you say that reliable investigative aids are needed to assist in combating the high crime rate and you believe that the PSE and the polygraph are such tools, I hope you are not suggesting that perhaps it might be a good idea for some outlandish scheme of every citizen in the United States to report to the post office once a month for polygraph or PSE tests so that we can immediately draw all of the inferences that are necessary to speed them on their way to trial for any crimes they may have committed.

Mr. McQuiston. No, sir. I am definitely not.

Mr. Cornish. I am really glad to hear that because somehow I get the feeling from reading some of these statements that we are going in that direction. For example, you state:

> Honest people sometimes need a means which allows them to be believed or accepted on face when their veracity is questioned or cannot otherwise be determined.

I always thought that trust and faith were built up over a period of time based on your conduct, your relationships, and things like that. A person's word was a very important thing in the society where I grew up in the Midwest.

Mr. McQuiston. I am from Columbus, Ohio, and I agree with that.

Mr. Cornish. That is right. I am from a State where it was a very important thing for me as a child in my family and in other families and also in business. Well, this is becoming sort of a dialog.

Mr. McQuiston. No, sir, it is not because I cannot fault you in what you said at all. That is my belief. It has been founded in the same place that yours was. Unfortunately, we do have situations which evolve where a person's word is taken for granted. One of those situations exists in a letter I have here from an attorney in Baltimore, Md. He took a client who had been convicted of first degree murder and was serving a life sentence for that murder and had this examination given and the PSE examination represented to that man a court of last resort. He was proven innocent and he was pardoned. The PSE was the initiator. It started a reinvestigation. And this man now has his freedom. Now how do we equate your morality and mine? My morality simply stated might be colloquially expressed as "your liberty ends where my nose begins" I don't know how you relate this to picketing.

Mr. CORNISH. You wouldn't abolish picketing, would you?

Mr. MCQUISTON. No, sir, I would not except if that picketing got out of hand and began to create a riot which was dangerous to society. I believe it is right to have peaceful demonstration and that is guaranteed to us and I would not limit it, but I say there are situations which erode this generic morality of ours. They have been eroding it for a long time.

Mr. CORNISH. I would like to just inquire into the International Society of Stress Analysts. How large is that?

Dr. HEISSE. We have 94 members at this time and it is less than 1 year old, sir. It does not purport to deal just with the PSE but with all levels of stress.

Mr. CORNISH. Is this a group much like the American Polygraph Association?

Dr. HEISSE. No: this is a multidisciplined group encompassing a wide span of various disciplines from police science through members of—well, we have a Ph. D. in drama who is using some of the modalities to see how much better a performance you get from an individual if he puts himself in the role of Hamlet rather than if he just mouths the words.

Mr. CORNISH. You don't have any permanent headquarters or anything like that?

Dr. HEISSE. As of this time, no, we do not have any permanent headquarters.

Mr. CORNISH. It is too small?

Dr. HEISSE. It is too small.

Mr. MCQUISTON. At this time.

Dr. HEISSE. However, we have those persons utilizing modalities of stress where we have three or four levels that they must qualify, and if they do not continue their education, they will be dropped within 3 years. We have a membership, an analyst, a fellow, and an honorary membership and we have only seven analysts at the present time, three honorary members, and no fellows. I am working hard at it with this paper that I submitted to you.

Mr. CORNISH. I don't want to invade your privacy, but have you ever served as a consultant or an employee of Dektor?

Dr. HEISSE. No, sir. Friend, yes.

Mr. CORNISH. Well, that is evident. Friends are important. Thank you, Mr. Chairman. I think that is all I have at the moment.

Mr. MOORHEAD. Mr. Kronfeld?

Mr. KRONFELD. As I understand, Colonel McQuiston, you view the PSE and the polygraph as a starting point in an investigation. It is not a true lie detection device, merely represents an indication of stress?

Mr. MCQUISTON. Yes, basically that is correct: however, within a particular structured system designed to point this stress in specific areas, it is and can be used as a so-called lie detector. It can give you a reasonably accurate opinion as to whether the person was deceptive or not within certain controlled standards.

Mr. KRONFELD. But you also agree that the only reading one gets from the PSE is of stress?

Mr. MCQUISTON. Yes, sir.

Mr. KRONFELD. Stress could be for many reasons such as taking the examination?

Mr. McQuiston. Yes, sir. That is why the controlled structure is needed because we know that a subject under examination can respond with these symptoms, if you will, for one of three reasons: He is the perpetrator or he was involved; he is a guilt complex responder and will show this stress under any direct accusatory statement or question; or he is concerned about some outside issue, which may be thousands of things which will cause him to show the identical stress as if he were to lie to a question. That is why the controlled structure on the polygraph and PSE must be absolute. It must guarantee that the examiner is guided to the correct solution for the stress.

Mr. Kronfeld. Also if I may interject, would it be accurate to say that the fact that a person was taking an examination on a device such as your PSE or polygraph could induce the stress itself?

Mr. McQuiston. Oh, there is definitely elevated nervous tension because of the test procedure which must be taken into account as one of those controlled factors in a so-called lie detector test.

Mr. Kronfeld. Therefore it would be generally inaccurate to state that a polygraph or PSE discerns the difference between truth or falsity?

Mr. McQuiston. You cannot make that statement. The examiner is the one who subjectively interprets the hard copy display.

Mr. Kronfeld. Well, let me back up again. Could I say that it would be generally inaccurate to say that an examiner could determine the difference between truth or falsity merely on the basis of the results of an examination, merely on the results of the graph?

Mr. McQuiston. No. If the examination is properly controlled, if the subject is properly prepared, if the instrumentation is functioning properly, you have a very high correlation of being able to detect truth and deception under definitely controlled tests.

Dr. Heisse. But in the end result you only get stress.

Mr. Kronfeld. I didn't quite understand that from your oral testimony. It is my understanding that you said the PSE merely was a starting point in an investigation?

Mr. McQuiston. It can be. We are dealing with two separate evaluations. One of them is a psychological stress evaluation, which is not a lie detection test. That may be used as an investigative aid with no more consideration given to whether the subject is lying or telling the truth. Now in a particular lie detection test there is a certain set of specific requirements which must be followed if the examiner's intent is to say this person is practicing deception. That also may be achieved with the proper controls.

Mr. Kronfeld. OK. That is what I wanted to make clear on the record, that the developers of the PSE do feel that it can in itself under proper conditions indicate truth or falsity.

Mr. McQuiston. Yes, under the proper conditions.

Mr. Kronfeld. OK. No more questions.

Dr. Heisse. Could I modify that statement and say it still is not a lie detector, that the examiner is doing that interpretation. It is subjective and the instrumentation itself simply will give you more stress or less stress to certain questions that are prepared.

And I think we should go one step further because somebody is going to touch on it at some time somewhere; namely, can this be used covertly, and can the polygraph be used covertly? Yes, they both can

be used covertly. Now are there advantages to it? Yes, there are advantages to it. Every one of you has gone through the school system and suddenly the teacher has walked into the room and said that we are going to give you a test today. Immediately your general nervous tension is up about this high [hand raised above table] simply because she said we are going to give you a test. Now if you can give this test in a covert way that is perfectly agreeable to the individual and perfectly fair to the individual—and this is where the morality comes in; you get this shady line that comes in—if the morality is good, you get a far better test, a far fairer test on the polygraph and the PSE covertly than overtly. You are going to ask me how do you do it with all of these things hooked up to him? Well, you can ask the polygraph examiners because I learned from them. But you certainly can run through the test the first time by going through the questions and say that we are not going to test, but you do it. Then the second time you can do the test and you still do it. So it could be done while you are hooked up.

Mr. KRONFELD. Would either of you recommend that PSE results, as properly interpreted, be accepted as evidentiary material in the courts?

Mr. MCQUISTON. Only by stipulation or as expert testimony within the adversary system but by no means as final proof of a person's guilt or innocence. I would modify that to say I would accept it as innocence but not as guilt.

Mr. KRONFELD. You would accept it.

Mr. MCQUISTON. If the person produced a chart which under the controlled circumstances was lacking the required stress for deception, yes, sir, I would free him. I would let him go. I would not convict him on the basis of that alone. It must be with a complete investigation. This equipment, the polygraph or PSE, is not designed to replace the proper investigations, interrogations, surveillance or whatever is required in the investigation. It is simply an aid to that investigation and it should be one part of the system and not stand by itself.

Dr. HEISSE. These systems lend themselves to the adversary system just as when two doctors are called to testify. One may say that the X-ray says A and another may say it says B and then we leave it to the jury to decide which doctor is right. They are both making an interpretation of a film. That is all.

Mr. CORNISH. What you are saying here is there are a lot of subjective judgments to be made?

Mr. MCQUISTON. Yes, sir; that is correct.

Mr. CORNISH. And they can't be determined——

Dr. HEISSE. In computer action.

Mr. MCQUISTON. No, the computer—well, this is a human relationship that we're dealing with and I know of nothing more complex than a human being; therefore I think that the art and the science, a blend of these two, must be fully realized. It must be taken in perspective as a valuable investigative tool and certainly not the judge, jury and executioner by any means.

If the person, if his rights are not explained to him, if it is not voluntary, if it is used as coercion, no, sir, I wouldn't buy that at all.

Mr. CORNISH. Well the inferences that the examiner draws——

Mr. MOORHEAD. I think we are going to have a vote here.

Mr. CORNISH. The inferences—I am——

Mr. McQuiston. You see, he has got you stressed now. That is stress.

Mr. Cornish. That is stress, right.

Mr. Moorhead. I've got stress in that I've got to go over and report on the floor of the House. So the committee will have to stand in recess until 2 o'clock this afternoon at which time it will hear from Cleve Backster, director of the Backster School of Lie Detection, New York, N.Y. We will also hear from Mr. Leo Pellerzi of the American Federation of Government Employees, and finally Mr. Fred H. Fuller, president, Technical Development, Inc.

Mr. McQuiston. Dektor stands ready to answer your questions at any time, sir.

Mr. Moorhead. Yes; I am sure you will be willing to answer questions submitted to you in writing?

Mr. McQuiston. Yes; we will.

Dr. Heisse. Yes, indeed.

[The questions and answers follow:]

Questions for Charles R. McQuiston

Question 1. In your testimony you refer to the PSE as a medical instrument. Because of the instrument's complexity, would it not be advisable to require all examiner-users to have some medical or clinical training and experience before accepting their interpretive conclusions of PSE tests?

Answer 1. The PSE and polygraph are considered medical instruments because they monitor physiological changes and are thus applicable in the medical profession and in the behaviorial sciences. This viewpoint neither limits their use to these fields nor does it impose the requirement of training or experiences in these fields as a prerequisite to its use. Of the two instruments, the PSE is far simpler to operate.

On the other hand, PSE purchasers receive, in addition to technical instruction in equipment operation and chart interpretation, a basic review of the psychosomatic interrelationships pertinent to both instruments. In addition, while they are gaining experience and confidence in their individual application of the PSE instrument, they have Dektor's experienced examiners available for telephone consultations, similar to an apprenticeship.

Question 2. When your services are engaged to administer PSE tests, does the subscriber specify whether the tests should be administered overtly or covertly?

Answer 2. The subscriber requesting PSE services generally does not state a specific requirement for either an overt examination or a covert examination. This detail is usually left to the examiner's discretion and is governed by the purpose of the examination.

The following recommendations are incorporated into the Dektor Orientation Course given to all PSE purchasers:

"If the purpose is 'lie detection,' the necessary personal pretest interview and specific set of control questions require that the examination be overtly administered, with subject's full knowledge and consent. If the purpose is to obtain a case lead and a direction for continuing investigation as in screening a large number of possible suspects, the examination might be overt or covert, depending on other details of the specific case. If the purpose is psychiatric diagnosis, either method might be used, depending on the physician's preferred type of test formation, as, for example, an 'emotion producing word' test or a question test."

Question 3. What is your recommended course of action, if the subscriber solicits your views?

Answer 3. We assume this question is asking, which method, overt or covert, would we recommend.

We would insist, to the subscriber seeking lie detection services, that an overt examination be conducted, with the subject's full knowledge and consent, for the reasons expressed above.

On the other hand, for purposes of psychiatric diagnosis, a covert examination of the type described can frequently be more effective than overt.

Question 4. If the PSE tests are administered overtly, is the subject advised of the results of the test, upon completion? At some later date?

Answer 4. Dektor advocates not only that the subject be advised of the test results, but that the results of the individual questions be discussed in a posttest interview with the subject, for any necessary clarifications of reactions and to explore the possible need for a second examination arising from those clarifications. Therefore, pursuant to Dektor's policy, as applied and as taught, the subject of an overt examination will thus be knowledgeable of the test results before the conclusion of the examination interview.

Even if this knowledge were not an integral part of the test procedure, we would feel that every person undergoing a lie detection examination has a right to know the results of his examination.

Question 5. If the PSE test is administered covertly, is the subject always advised (a) he has been tested; (b) of the results of the test? When is he advised, if such advice is given?

Answer 5. A PSE test which is administered covertly is generally not a bona fide lie detection test, as explained in the answer to question No. 2.

Normally, a covert PSE examination would be of an investigatory, stress evaluation type, such as an investigating officer might conduct by telephone on several suspects to question them about the case and record the conversation. The officer might determine, from a lack of stress, that the subject was not involved; however, if there were stress, the officer could not determine that the subject was lying without using those control elements required for the analytical process by which the stress is equated to attempted deception. Without these controls, the presence of stress might indicate only apprehension or some emotional involvement with the case, and would provide only case direction to trigger a properly controlled, overt "lie detection" examination and/or other investigation techniques.

Question 6. What are the prerequisite qualifications (education, training, and experience) for individuals who you feel are qualified to administer tests using the PSE? By whom were these qualifications developed, and on what basis?

Answer 6. These prerequisites vary with the disciplines in which the prospective PSE purchasers plan to utilize the instrument. The degree of professional proficiency is a matter for State regulation, differing widely, and is therefore not under Dektor's control.

We do, however, control technical proficiency with the instrument, requiring that the user learn, to our satisfaction, the operation of the equipment and the chart interpretation criteria. We warn every prospective customer that our PSE Orientation Course is designed for the professional with a background in interrogation, investigation or psychology. Not only have we refused to enroll in the course persons apparently lacking these types of background, but also have required several students, before purchasing, to take additional instruction, at no additional charge, in order to meet our technical performance standards.

Consultations on field applications and problems are available with Dektor's experienced examiners, and complete a system of selective screening, training, and telephone supervision, which has produced a remarkably high effectiveness level.

This system has been developed professionally and pragmatically by Dektor's staff of responsible polygraph examiners, weighing the various selection factors and instruction emphases, against the resultant in-the-field performance of the PSE trainees with whom contact has been maintained.

Question 7. What qualifications have you recommended to those States where you are working toward licensing or regulation of PSE examiners?

Answer 7. For those States with existing laws for the licensing and regulation of polygraph/detection-of-deception examiners, we recommend an amendment developed jointly by Dektor and Florida Department of Occupational Licensing, to include PSE/detection-of-deception examiners. This amendment is currently in force in the State of Florida in the form of an administrative code (1) permitting the licensing of PSE detection-of-deception examiners under prescribed requirements; (2) legislation is now pending in Florida to amend chapter 493 of the Florida statute, to include the PSE as a prescribed instrumentation, with section 6(4)a-i prescribing the training requirements.

The same amended bill, or another version, (3) proposed before the Virginia Legislature could be used by States which presently wish to initiate laws governing the use of "lie detectors".

(1) Florida Administrative Code 1C-4.05, attached as exhibit A.

(2) Proposed Florida legislative Senate Bill 571, attached as exhibit B.

(3) Proposed amendment to the Commonwealth of Virginia Polygraph Examiner's Law, attached as exhibit C.

Question 8. Is there a national association of individuals (or firms) using PSE equipment, and if so, what is the size and composition of its membership?

Answer 8. The International Society of Stress Analysts, presided over by John W. Heisse, Jr., M.D., is the major professional association of individuals involved with stress analysis. The Florida chapter, Florida Association of Psychological Stress Analysts has a current membership of approximately 50 members, some, but not all, of whom are included in the membership of over 94 in the international society. Many members of both associations use the PSE instrumentation, although other forms of stress instrumentation are also represented. The memberships include psychiatrists, physicians, and other medical personnel, psychologists, PSE and/or polygraph examiners, behaviorial scientists and researchers, educators, and others.

Further information on the International Society of Stress Analysts is contained in Dr. Heisse's presentation to the subcommittee on June 4, 1974.

Question 9. Have the courts given equal, greater, or less acceptance to the results of PSE tests than to the results of polygraph tests?

Answer 9. Although the numbers are not large as yet, the speed with which certain specific courts have progressed to accept the PSE results by stipulation, seems to suggest a possible greater acceptability of PSE over polygraph. This may, however, be merely coincidental with an apparent increase in court acceptances of the polygraph.

Question 10. Information currently available to the subcommittee shows the following procurements of PSE's by Federal agencies through November 1973:

DOD:	
Army	3
Air Force	1
NASA	2
Total	6
VA	1
Total	7

Testimony given indicates the ownership of additional PSE's by other Federal Government agencies. Please furnish the most current information available (through the date of the hearings) on sales to Federal agencies. If your firm has unfilled orders for such equipment, identify the ordering agency and the number of units to be delivered.

Answer 10. Dektor PSE's purchased by Federal agencies:

Serial No.[1]	Date of Sale	Agency	Trainees
1560 (1)	June 22, 1974	NASA, Ames Research Center, Moffett Field, Calif.	Hodgson, Mike, and Naro, Peter.
1572 (1)	May 24, 1974	Patuxent Air Test Center, Patuxent, Md.	Helm, Mark, and Walchli, Richard.
1493 (1)	Nov. 14, 1973	Human Engineering Labs, Aberdeen Proving Grounds, Aberdeen, Md.	Wokoun, William.
326 (1)	July 1973	Sharpe Army Depot, Lathrop, Calif.[2]	Downey, Jack, and Kalush, Paul.
233 (1)	Apr. 19, 1973	VA Hospital, Danville, Ill.	Haskin, Paul.
63 (1)	July 5, 1972	Drug Rehabilitation Center, U.S. Naval Air Station, Yukon, Fla.[2]	Curtis, David, and Shepherd, Walter.
51 (1)	May 1972	USAFOSI, Washington, D.C.[2]	Boothe, Kenneth.
31 and 32 (2)	Jan. 24, 1972	USAMERDC, CDC, Fort Belvoir, Va.	Gallagher, Gerald.
10 (1)	May 1972	Fort George G. Meade, Fort Meade, Md.	None.
6 (1)	do	Aberdeen Proving Ground, Aberdeen, Md.	Do.

[1] Total of 11.
[2] These trainees had requested confidentiality regarding their agency's purchase.

Question 11. Is it not true that the psychological stress evaluator indicates only stress and any inferences drawn only by the examiner?

Answer 11. The psychological stress evaluator, as any other physiological instrumentation including the polygraph, indicates a physiological condition—in this case, the absence of frequency modulations in the voice—which involuntarily accompanies a reaction to stressful stimuli and therefore becomes an indicator of stress.

When stress indicators are instrumented under the carefully controlled condition of an appropriately formulated test, and therein analyzed to determine causality, an experienced and perceptive inquirer can distinguish the stress caused by an attempted deception from stress resulting from other possible causes.

Exhibit A

Rules of the Department of State—Chapter 1C–4

Regulations of Detection of Deception Examiners

1C–4.01 Definitions
1C–4.02 Application for approval
1C–4.03 Classroom presentation
1C–4.04 Curriculum
1C–4.05 Use of instrument other than polygraph to detect truth or deception

1C–4.01 Definitions. The definitions as set forth in Chapter 493, Part II, Florida Statutes, shall be applicable to these rules and regulations. In addition, the following terms shall mean:

(1) Detection of Deception Schools—The term detection of deception school shall mean and include the teaching by a person or persons to another the act of operating any device or instrument which records as minimum standards, permanently and simultaneously, the examinee's cardiovascular (blood pressure and pulse) and respiratory (breathing) patterns, in order to examine individuals for the purpose of detecting truth or deception. Such an instrument may record additional physiological changes pertinent to the detection of truth.

(2) Application for Approval—The term application for approval shall mean and include a written statement used for the purpose of seeking approval by the Department of State.

(3) Classroom Presentation—The term classroom presentation shall mean and include all types of instruction relating to the teaching of detection of deception examiners actually performed in connection with the teaching regardless of the location of the teaching.

(4) Curriculum—The term curriculum shall mean and include the course of study offered by an educational institution or one of its branches.

(5) Approval—The term approval shall mean and include the act by which a decision of approval or disapproval is reached based on these rules and regulations.

General Authority 493.41 FS. Law Implemented 493.41 FS. History—New 7–7–68

1C–4.02 Application for approval.

(1) Every school desiring the approval by the secretary shall file with the secretary a written notarized application for each owner or owners and or all partners, and or all corporate officers of polygraph schools.

(2) The written application shall be in accordance with the following provisions:

(a) The application shall be prepared by the applicant, signed by the applicant seeking approval and be notarized and shall contain the following information:

1. Full name and title
2. Age, date and place of birth
3. Present residence address
4. Occupation of applicant currently held
5. A statement that he is a citizen of 21 years
6. The address of the principal place in which the school is to be conducted
7. A full set of fingerprints and a photograph of the signatory taken within two years immediately preceding the submission of the application.
8. A statement of any or all arrests of the signatory.
9. A schedule of courses to be taught; number of hours of each course.
10. The person teaching the course and their qualifications to teach the course.
11. A schedule of curriculum.
12. Such further specific facts as may be required by the secretary to show that the person signing the application is competent, honest, truthful, trustworthy, of good character and bears a reputation for fair dealing.
13. The faculty or instructors of schools must be able to meet character requirements as follows: The applicant needs to make a statement to the effect to this office.

(a) Establish that he is a person of honesty, truthfulness, integrity, moral fitness, and has a reputation for fair dealing.

(b) Has not been convicted of a misdemeanor involving moral turpitude or a felony or has not been released or discharged under any other than honorable conditions from the armed forces of the United States.

14. The applicant shall submit such specific facts as may be required by the secretary to show that the instructors are competent, honest, truthful, trustworthy, of good character and bears a reputation for fair dealing.

General Authority 493.41 FS. Law Implemented 493.41 FS. History—New 7-7-68.

1C-4.03 Classroom presentation.

(1) In approved schools all courses shall be taught by classroom presentation, however, such classroom presentation is not to preclude outside reading assignments.

(2) In approved schools, classroom presentation shall be made by instructors who are specialists in the field in which they instruct.

General Authority 493.41 FS. Law Implemented 493.41 FS. History—New 7-7-68.

1C-4.04 Curriculum.

(1) Curriculum in approved schools shall be a minimum to include:

(a) Polygraph instrument familiarization
(b) Physiology
(c) Psychology as related to polygraph
(d) Formulation of polygraph questions
(e) Techniques of polygraph
(f) Chart interpretation
(g) Interrogation techniques
(h) Examination observation
(i) Practice exercises

General Authority 493.41 FS. Law Implemented 493.41 FS. History—New 7-7-68.

1C-4.05 Use of instrument other than polygraph to detect truth or deception.

(1) No person within this State shall use any device other than a "polygraph" as defined in Subsection 493.40(3), Florida Statutes, to administer examinations for the purposes of detecting truth or deception unless:

(a) the person examined has consented in writing to the examination;

(b) if such device operates upon an oral statement, the statement is made solely for the purpose of the examination and the examination is made simultaneously with the making of the statement;

(c) the person administering such examination is licensed by the Department pursuant to Subsection (3) below.

(2) Every person selling any device or instrument other than a "polygraph" as defined in Subsection 493.40(3), Florida Statutes, shall provide the Department with the names of all persons to whom such devices or instruments are sold.

(3) Every person administering detection of deception examinations, other than persons using "polygraphs" as defined in Subsection 493.40(3), Florida Statutes, must qualify individually for a license from the Department. An applicant is qualified to receive a license:

(a) who is at least twenty-one years of age; and

(b) who is a citizen of the United States; and

(c) who establishes that he is a person of honesty, truthfulness, integrity, moral fitness, and has a reputation for fair dealing, and

(d) who has not been convicted of a misdemeanor involving moral turpitude or a felony or has not been released or discharged under any other than honorable conditions from any of the armed forces of the United States; and

(e) who has completed a 2-year, junior college level, course of instruction in criminology, police science or psychology from a full 4-year university or college recognized as such by the Department or this requirement may be received for those persons who have a high school diploma and 4 years' experience as an investigator or detective with a municipal, county, State or Federal agency;

(f) who has satisfactorily completed a formal training course of at least 2 weeks' duration at a school instructing in the use of the instrument or device which the applicant desires to use, which school shall be recognized and approved by the Department;

(g) who is administering examinations by use of a machine which has been demonstrated to the Secretray's satisfaction to perform the function which it is purported to perform.

(4) This rule shall not apply to:

(a) medical practitioners who are utilizing truth or deception instrumentation for the purpose of medical analysis, diagnosis, or treatment.

(*b*) scientific researchers and educators who are utilizing truth or deception instrumentation for pure research of psychological classification and who are operating under the auspices of an accredited junior college, college, or university in this State.

(*c*) detection of deception employed by a municipal, county, State or Federal agency as long as his sole use of the instrument is in the performance of his official duties.

(General Authority 493.41(1) FS. Law Implemented 493.41(1) FS. History—New 1–19–74.)

EXHIBIT B

An act relating to detection of deception examiners; creating part III of chapter 493, Florida statutes; declaring legislative intent; providing definitions; providing qualifications for license; providing qualifications for approved schools; providing exclusions; providing license fees; providing for bond; providing for regulations; providing penalties and providing an effective date:

Be it enacted by the Legislature of the State of Florida:

Section 1. Legislative intent.—The legislature finds that there has been tremendous advancement in electronic instrumentation dealing with the detection of truth or deception and that there now exists other instruments or devises, other than the polygraph, for detecting truth or deception; it is the intent of the legislature that any natural person who operates any device, machine, or instrument whatsoever for the detection of truth or deception shall meet all of the qualifications required and shall be licensed.

Section 2. Section 493, Florida statutes, part III, is created to read:

493.60 Definitions, part III

The following terms shall mean:

(1) "Examiner" shall mean and include any person who uses any instrument, device, or machine, other than a polygraph, to examine individuals for the purpose of detecting truth or deception.

(2) "Licensee" means only natural persons.

(3) "Department" means Department of State.

(4) "Emotional reaction detector" means any device, machine, or instrument, other than a polygraph, capable of measuring and recording one or more of an individuals physiological reactions to emotions for the purpose of detecting truth or deception.

Section 3. 493.61. Powers and duties of the Department of State.—(1) The Department of State is hereby vested with the power, jurisdiction, and authority to issue, deny, suspend, assess a civil penalty or revoke licenses to detection of truth or deception examiners. The Department shall have the power, jurisdiction, and authority to promulgate rules and regulations for its power hereunder for the conduct of the business or practice of administering examinations for the purpose of detecting truth or deception not in conflict with the Constitution and laws of the United States or this State and may amend same at its pleasure.

(2) No person shall administer examinations for the purposes of detecting truth or deception without first receiving from the Department of State a license as provided herein.

Section 4. 493.62. Application for license.—Examiners must qualify individually for a license and shall file with the Department a written application accompanied by a fee of $25 to cover costs. The fee shall not be rebatable.

(2) The written application shall be in accordance with the following provisions:

(a) The application shall be signed and verified by the individual and shall contain the following information:

1. Full name and title of position;

2. Age, date, and place of birth;

3. The present residence address and the residence addresses within the 5 years immediately preceding the submission of the application;

4. Occupations held presently and within the 5 years immediately preceding the submission of the application;

5. A statement that he is a citizen of the United States and over the age of 18 years;

6. The address of the principal place in which the business is to be conducted;

7. Statement of educational qualifications;

8. The name under which the business is to be conducted;
9. Proof of formal instrument training as provided herein;
10. A full set of fingerprints and a photograph of the signatory taken within 2 years immediately preceding the submission of the application;
11. A statement of the experience of the signatory which he believes would qualify him for a license under this part;
12. A statement of any or all arrests of the signatory; and
13. Such further facts as may be required by the Department to show that the person signing the application is competent, honest, truthful, trustworthy, of good character, and bears a reputation for fair-dealing.

Section 5. 493.63, License requirements.—An applicant is qualified to receive a license—

(1) As an "examiner":

(*a*) Who is at least 18 years of age; and

(*b*) Who is a citizen of the United States; and

(*c*) Who establishes that he is a person of honesty, truthfulness, integrity, moral fitness, and has a reputation for fair dealing; and

(*d*) Who has not been convicted of a misdemeanor involving moral turpitude or a felony or has not been released or discharged under any other than honorable conditions from any of the Armed Forces of the United States; and

(*e*) Who has completed a 2-year, junior college level, course of instruction in criminology, police science, or psychology plus 2 years of investigative experience with a municipal, county, State, or Federal agency or who has a bachelor's degree in law, criminology, police science, or psychology from a full 4-year university or college recognized as such by the department or this requirement may be waived for those persons who have a high school diploma and 4 years experience as an investigator or detective with a municipal, county, State, or Federal agency, and

(*f*) Who has satisfactorily completed a formal training course of at least 2 weeks duration at an examiner's school instructing in the use of an instrument or device as described in section 493.60(4), which school shall be recognized and approved by the department.

Section 6. 493.64 Approved schools.—

(1) Definitions—the following terms shall mean:

(a) Emotional reaction detector schools—shall mean any school (other than a polygraph school) that teaches the operation of an instrument or device capable of measuring and recording one or more of the physiological reactions to emotions. The curriculum shall provide for a minimum of 2 weeks of instruction.

(b) Classroom presentation: The term classroom presentation shall mean and include all types of instruction relating to the teaching and detection of deception examiners actually performed in connection with the teaching regardless of the location of the teaching.

(c) Curriculum: The term curriculum shall mean and include the course of study offered pertaining to the detection of truth or deception by any educational institution or one of its branches.

(d) Approval: The term approval shall mean and include the act by which a decision of approval or disapproval is reached based on this section.

(2) Every school desiring approval by the department shall file with the department a written notarized application, for each owner or owners and or all partners and or all corporate officers, which shall be in accordance with the following provisions:

(a) The application shall be prepared by the applicant, signed by the applicant seeking approval and be notarized and shall contain the following information:

1. Full name and title.
2. Age, date, and place of birth.
3. Present residence address.
4. Occupation of applicant currently held.
5. A statement that he is a citizen of 18 years.
6. The address of the principal place in which the school is to be conducted.
7. A full set of fingerprints and a photograph of the signatory.
8. A statement of any or all arrests of the signatory.
9. A schedule of courses to be taught, number of hours of each course.
10. The person teaching the course and their qualifications to teach the course.
11. A schedule of curriculum.

12. Such further specific facts as may be required by the department to show that the applicant is competent, honest, truthful, trustworthy, of good character and bears a reputation for fair dealing.

13. The faculty or instructors of schools must be able to meet character requirements as follows:

The applicant needs to make a statement to this effect to this office.

(a) Establish that he is a person of honesty, truthfulness, integrity, moral fitness, and has a reputation for fair dealing.

(b) Has not been convicted of a misdemeanor involving moral turpitude or a felony or has not been released or discharged under any other than honorable conditions from the Armed Forces of the United States.

14. The applicant shall submit such specific facts as may be required by the department to show that the instructors are competent, honest, truthful, trustworthy, of good character and bears a reputation for fair dealing.

(3) Classroom presentation.

(a) In approved schools all courses shall be taught by classroom presentation, however, such classroom presentation is not to preclude outside reading assignments.

(b) In approved schools, classroom presentation shall be made by instructors who are specialists in the field in which they instruct.

(4) Curriculum.

The curriculum in approved schools shall be a minimum to include:

(a) Instrument familiarization, 20 hours.

(b) Physiology as related to truth or deception, 4 hours.

(c) Psychology as related to truth or deception, 8 hours.

(d) Formulation of test questions, 16 hours.

(e) Techniques of testing, 4 hours.

(f) Chart interpretation, 20 hours.

(g) Interrogation techniques, 20 hours.

(h) Examination observation, 12 hours.

(i) Practice exercises, 16 hours.

Section 7. 493.65 Inapplicability of part III of this chapter.—

This part shall not apply:

(1) To medical practitioners who are utilizing truth or deception instrumentation for the purpose of medical analysis, diagnosis, or treatment.

(2) To scientific researchers and educators who are utilizing truth or deception instrumentation for pure research or psychological classification and who are operating under the auspices of an accredited junior college, college, or university in this State.

Section 8. 493.66 Fees.—

(1) The license fees applicable to the various types of licenses provided under part III of this chapter shall be as follows:

(a) Examiner—$50.

(2) The appropriate license fee shall be paid by certified check or money order at the same time that the applicant submits the bond required by section 493.09. There shall be no prorating of license fees.

Section 9. 493.67 Investigation of applicant by Department of State.—The Department shall make such individual investigations of applicants for licenses under part III of this chapter as it may deem necessary.

Section 10. 493.68 Licensee's bond: Each individual licensee shall be required to post a bond as required in Section 493.09.

Section 11. 493.69 Issuance of license.—

(1) When the Department of State shall be satisfied of the good character, competency, and integrity of the applicant for an examiner's license, it shall inform such applicant of its findings and that license shall be issued upon the applicant's posting a licensee's bond as provided for in section 493.09. Upon the posting of such licensee's bond, the department shall issue and deliver to such applicant a license to conduct the type of business applied for at the premises stated in the application. Such license shall not be transferable and shall be revoked or canceled only by the department.

Section 12. 493.70 License, contents, and posting.—

(1) The license issued pursuant to part III of this chapter shall be for a period beginning July 1 of each year and expiring June 30 of the succeeding year and shall be in such form as may be determined by the Department of State, but shall at least specify the applicant's name, the type and number of license, the address of the principal place of business and the date on which it will expire.

(2) The license shall at all times be posted in a conspicuous place in the principal place of business of the licensee in this State.

Section 13. 493.71 Renewal of licenses: Licenses granted under part III of this chapter may be renewed by the Department of State in the same manner and under the same provisions provided by section 493.12.

Section 14. 493.72 Power of Department of State to deny, suspend, or revoke licenses: The Department of State may deny, refuse to renew or may suspend or may revoke licenses issued under part III of this chapter upon the same grounds as set forth in section 493.14.

Section 15. 493.73 Denial of application; hearing; appeal: The procedure set forth in section 493.16, relative to denial of application, hearing, and appeal, shall be applicable to all licenses issued under part III of this chapter.

Section 16. 493.74 Advisory council: Advisory council as set forth in section 493.23(3), shall also be the advisory council for part III of this chapter; provided, however, that an additional member be appointed to the council representing the licensees under this part.

Section 17. 493.75 Prohibited acts: No licensee under this part shall examine any person, by the use of any instrument, device or machine whatsoever, for the purpose of detecting truth or deception without the express consent of the person to be examined. The consent of the examinee must be obtained prior to any examination.

Section 18. 493.76 Violation: penalties: Any person who violates any provisions of this part for the first offense shall be guilty of a misdemeanor of the first degree and any further violation shall be deemed a felony of the third degree.

Section 19. 493.77 Applicability of part III when effective—

(1) Any person licensed as a polygraph examiner in this State shall, upon presentation of proof of satisfactory completion of an applicable course of instruction, be permitted to operate any other instrument utilized for the detection of truth or deception.

(2) Any person who, as of the date of the passage of this law, is engaged in the occupation, business, or profession of detection of deception examiner in this State, other than a polygraph examiner, shall receive a license from the Department automatically upon filing the application, paying the fee and procuring an approved bond provided for in this part; provided the application is received prior to October 1, 1974.

Section 20. 493.78 Construction of part III; admissibility of evidence.—This part does not authorize or imply the admissibility into evidence of the results of a truth or deception examination in judicial proceedings.

Section 21. Effective date.—This act shall take effect immediately upon becoming law.

EXHIBIT C

An act to provide for the licensing and regulation of detection of deception examiners; declaring General Assembly intent; providing for qualifications; providing definitions; providing for licenses; providing penalties; providing an effective date.

Be it enacted by the General Assembly of Virginia:

1. As used in this act unless the context requires a different meaning:

(a) "Polygraph examiner," hereinafter referred to as "examiner," shall mean and include any person who uses a polygraph to examine individuals for the purpose of detecting truth or deception.

(b) "Detection examiner," hereinafter referred to as "examiner," shall mean and include any person who uses any instrument, device, or machine, other than a polygraph, to examine individuals for the purpose of detecting truth or deception.

(c) "Person" means any natural person, partnership, association, corporation, or trust.

(d) "Department" means the department of professional and occupational registration.

(e) "Director" means the director of the department of professional and occupational registration.

(f) "Polygraph" means an instrument utilizing attached body sensors, which records permanently and simultaneously an individual's physiological reactions to emotions including but not limited to the cardiovascular and respiratory patterns for the purpose of detecting truth or deception.

(g) "Emotional reaction detector" means any device, machine, or instrument, other than a polygraph, capable of analyzing the human voice and registering permanently, one or more of an individual's physiological reactions to emotions for the purpose of detecting truth or deception.

2. Every examiner shall use an instrument which records permanently an individual's reactions to emotions for the purpose of detecting truth or deception.

3. (a) No person shall administer an examination as set forth in 1(f) and (g) of this act, or any imitation thereof, without first securing an examiner's license. Each application for an examiner's license shall be made to the department in writing on forms provided by the department and shall contain such information as is required by the department to determine the eligibility of the applicant. Each application for the examiner's license shall be accompanied by a fee of $50, which is nonrefundable, provided, however, no such fee shall be charged to any examiner in the full-time employ of any state or local police department or sheriff's office of a political subdivision of the State.

(b) Each applicant for the examiner's license shall submit his fingerprints to the department together with a sworn affidavit that said applicant—

(1) is a citizen of the United States.

(2) is at least 21 years of age.

(3) is a high school graduate.

(4) has successfully completed a course of formal training in detection of deception in an institution accepted by the department. This course of instruction must include a minimum of 120 hours of formal instruction in detection of deception, provided:

For a period of 1 year from the effective date hereof, any person who has actually engaged in the occupation, business or profession of detection of deception examination for 1 year prior to the effective date hereof, and after fulfillment of all other requirements, shall be issued a license hereunder, provided that the department may require such person to submit satisfactory proof that he has so engaged for such period.

(5) Has not been convicted of a misdeameanor involving moral turpitude or a felony, or who has not been released or discharged under other than honorable conditions from any of the Armed Services of the United States, or any branch of the State, city or Federal Government.

(c) Upon receipt of an application for an examiner's license, the Director shall investigate each application, and no license will be issued until said investigation is complete. Said investigation shall be completed within 90 days following receipt of application.

4. (a) Each examiner's license shall be issued to the term of 1 (calendar) year or for such part thereof as remains at the time of the issuance thereof. Each examiner's license shall be renewed during the month of December of each year, and each examiner's license not so renewed shall expire on December 31 of that year. A renewal fee of $25 shall accompany each renewal application for the examiner's license.

(b) An examiner whose license has expired may, at any time within 5 years after the expiration thereof, obtain a renewal license by making a renewal application therefor and by paying a renewal, license fee for each year since the expiration of his license; provided, however, any examiner whose license expired while he was (i) on active duty with Armed Forces of the United States, or (ii) called into service or training with the State Militia, or (iii) in a training or education program under the supervision of the United States, preliminary to induction into the military service, may have his license renewed without paying any intervening renewal license fee if within 2 years after termination of such service, training, or education, except under conditions other than honorable, he furnishes the department an affidavit to the effect that he has been so engaged and that his service, training or education has been so terminated. The director shall, before issuing the renewal license, investigate each applicant during the expiration period to determine that all applicants for renewal of license meet all requirements stipulated for initial licensing according to this act.

5. (a) A license or duplicate license must be prominently displayed at each place of business of every examiner. The fee for a duplicate license is $5. Each license shall be signed by the director and shall be issued under the seal of the department.

(b) Notice in writing shall be given to the department by such license holder of any change of principal business location whereupon, the department shall issue a new license for the unexplored period. Without notification to the depart-

ment and without the issuance by it of a new license, the license theretofore issued shall automatically be suspended, except for good cause shown.

6. Each nonresident applicant for an examiner's license or a renewal license shall file an irrevocable consent, that actions against the applicant may be filed in any appropriate court of any county or municipality of the Commonwealth in which the plaintiff resides or in which some part of the transaction occurred out of which the alleged cause of action arose and that process in any action may be served on the applicant by leaving two copies thereof with the director of the department. Such consent shall stipulate and agree that such service of process shall be valid and binding for all purposes. The director shall send forth with one copy of the process to the applicant by registered or certified mail at the address shown on the records of the department.

7. The department may deny, suspend or revoke any license on any one or more of the following grounds:

(a) Material misstatement in the original application or in the application for a renewal license.

(b) Willful disregard to violation of this act or any regulation or rule issued pursuant thereto.

(c) If the holder of any license has been adjudged guilty of the commission of a felony or a misdemeanor involving moral turpitude.

(*d*) Making any willful misrepresentation of false promises or causing to be printed any false or misleading advertisement for the purpose of directly or indirectly obtaining business.

(*e*) Allowing one's license under this act to be used by an unlicensed person in violation of the provisions hereof.

(*f*) Willfully aiding or abetting another in the violation of this act or of any regulation or rule issued pursuant thereto.

(*g*) Where the licensed holder has been adjudged mentally ill or mentally deficient.

(*h*) Failing within a reasonable time to provide information requested by the Department as the result of a formal or informal complaint to the Department.

No. 8. Any unlawful act or violation of any of the provisions of this act upon the part of any examiner shall not be cause for revocation of the license of any other examiner for whom the offending examiner may have been employed, unless it shall appear to the satisfaction of the Department that the examiner has willfully aided or abetted the actions or activities of the offending examiner.

No. 9. The Department shall publish, at least annually, a list of the names and addresses of all examiners and of all persons whose license has been suspended or revoked within that year, together with such other information relative to the enforcement of the provisions of this act as it may deem of interest to the public or the profession. One such list shall be mailed to the clerk of each county and city of the Commonwealth, and shall be held by such clerk as a public record; such list shall also be mailed by the Department to any person in the Commonwealth upon request.

No. 10. The Department may upon its own motion and shall upon the verified complaint in writing of any person setting forth facts which if proved would constitute ground for denial, suspension, or revocation of a license under this act, investigate the actions of any applicant or any person holding or claiming to hold a license. The Department shall, before denial, suspension, or revocation of a license, at least 10 days prior to the date set for the hearing, notify in writing the applicant or holder of a license of the nature of the charges and that a hearing will be held on the date designated. The hearing shall determine whether the applicant or holder, hereinafter called the respondent, is privileged to hold such license, and shall afford the respondent an opportunity to be heard in person or by counsel in reference thereto. Such written notice may be served by personal delivery to the respondent or by mailing the same by registered or certified mail with return receipt requested to the place of business last specified by the respondent on the records of the Department; at the time and place fixed in the notice, the Director shall proceed to hear the charges; and both the respondent and complainant shall be accorded ample opportunity to present in person or by counsel such statements, testimony, evidence, and argument as may be pertinent to the charges or to the defense thereto. The Director may continue such hearing from time to time. If the Director shall not be sitting at the time and place fixed in the notice or at the time and place to which the hearing shall have been continued, the Director shall continue such hearing for a period not to exceed 30 days.

No 11. (*a*) The Department, at its expense, shall provide a stenographer to

take down the the testimony and preserve a record of all proceedings of a license. The notice of hearing, complaint, and all other documents in the nature of pleadings and written motions filed in the proceedings, the transcript of testimony, the report of the Director, and orders of the Department shall be the records of such proceedings. The Department shall furnish a transcript of such record to any person interested in such hearing upon the payment therefor of 75 cents per page for carbon thereof ordered with the original; provided, however, the charge for any part of such transcript ordered and paid for previous to the writing of the original record thereof shall be 25 cents per page.

(*b*) In any case involving the denial, suspension, or revocation of a license, a copy of the Director's report shall be served upon the respondent by the Department, either personally or by registered or certified mail as provided in this act for the service of the notice of hearing. Within 20 days after such service, the respondent may present to the Department a motion in writing for a rehearing, which written motion shall specify the particular grounds thereof. If no motion for rehearing is filed, then upon the expiration of the time specified for filing such a motion, or if a motion for rehearing is denied, then upon such denial, the Director may enter an order in accordance with recommendations of the Department. If the respondent shall order and pay for a transcript of the record within the time for filing a motion for rehearing, the 20-day period within which such a motion may be filed shall commence upon the delivery of the transcript to the respondent.

No. 12. Any circuit or corporation court having criminal jurisdiction in the county or city in which the offense giving rise to the hearing is alleged to have taken place, either in term time or vacation, may, upon application of the Director or the applicant or licensee against whom proceedings upon No. 10 of this act are pending, enter an order requiring the attendance of witnesses and their testimony, and the production of documents, papers, files, books, and records in connection with any hearing in any proceedings thereunder.

No. 13. Appeals shall be as provided in chapter 1.1 of title 9 of the code of Virginia.

No. 14. Upon the revocation or suspension of any license, the licensee shall forthwith surrender the license of the Department within 30 days from notification; and if the licensee fails to do so, the Department shall have the right to seize the same.

No. 15. If any person violates the provisions of this act, the Director shall, in the name of the Commonwealth, through the Attorney General or any person designated by him, apply in any court of competent jurisdiction, for an order enjoining such violation or for an order enforcing compliance with this act. Proceedings under this section shall be in addition to, and not in lieu of, all other remedies and penalties provided by this act.

No. 16. An order or a certified copy thereof, over the seal of the Department and purporting to be signed by the Director, shall be prima facie proof thereof—

(*a*) That such signature is the genuine signature of the Director;

(*b*) That such Director is duly appointed and qualified; and

(*c*) That the Director and Department thereof are qualified to act.

No. 17. The violation of any of the provisions of this act shall constitute a misdemeanor and be punishable by a fine of not less than $100 nor more than $500 or by imprisonment for not more than 12 months, or both such fine and imprisonment.

No. 18. None of the provisions of this act shall apply—

(1) To examiners employed by a municipal, county, State, or Federal agency as long as their sole use of the instrument is in the performance of their official duties.

(2) To medical practitioners who are utilizing truth or deception instrumentation for the purpose of medical analysis, diagnosis, or treatment.

(3) To scientific researchers and educators who are utilizing truth or deception instrumentation for pure research or psychological classification and who are operating under the auspices of an accredited junior college, college, or university in this Commonwealth.

(4) If any section, subsection, sentence, part, or application of this act be held unconstitutional by a court of last resort, such holding shall not affect any other section, sentence, part, or application which can be given effect without the part so held invalid.

Mr. MOORHEAD. The subcommittee is in recess until 2 o'clock.

[Whereupon, at 12:30 p.m., the subcommittee recessed, to reconvene at 2 p.m., the same day.]

Mr. MOORHEAD. The Subcommittee on Foreign Operations and Government Information, please come to order.

The subcommittee would like to hear from Mr. Cleve Backster, director, Backster School of Lie Detection, New York, N.Y.

Mr. Backster, we are pleased to have you with us. You may proceed when you are ready.

STATEMENT OF CLEVE BACKSTER, DIRECTOR, BACKSTER SCHOOL OF LIE DETECTION, NEW YORK, N.Y.

Mr. BACKSTER. Do you want to administer the oath?

Mr. MOORHEAD. I am not going to do that at this time. We must have two members present for that purpose.

Mr. BACKSTER. Mr. Chairman, members of this subcommittee, I would first like to thank the Foreign Operations and Government Information Subcommittee for the invitation to continue my participation in their effort to further develop a body of knowledge of conventional polygraph technique and instrumentation. I also appreciate the opportunity to comment on other so-called lie-detection methods currently being promoted as having similar capabilities.

In this preliminary statement, I wish to attempt to briefly review some of the basic considerations involved in the more conventional detection of deception processes. I do so wishing to avoid possible confusion in a subsequent comparison of techniques.

Of utmost importance in a polygraph examination is the psychophysiological chain of events occurring in response to a strong relevant question. For example, during deception:

1. Subject answers the polygraph examiner's relevant question with a lie.
2. The lie stimulates the fear of detection of deception.
3. The fear of the detection of deception stimulates a variety of psychophysiological changes within the subject's body.
4. Certain of these psychophysiological changes are recorded upon a moving chart.
5. The polygraph examiner then evaluates the relevant question reaction.

The procedure stated, thus far, brings up an important consideration. Can the polygraph examiner safely identify one emotion from another by merely looking at a relevant question reaction on a polygraph chart? It is my belief that the answer is that he cannot—with any degree of consistency.

It is extremely important that this problem be overcome by the use of a carefully structured procedure that is designed to allow the examiner to isolate not only "fear" as the emotion involved, but also to distinguish "fear of the detection of deception" from the other varieties of "fear."

The principal solution in most modern polygraph techniques, regardless of minor variations, is the use of a carefully structured and reviewed control question procedure. Successful use of such a control procedure embraces the concept which I have termed "anticlimax dampening". Basically this involves the psychological premise that an individual will gear his attentiveness and receptivity to the "greater

threat to his well-being". This is further based on the psychological principle that the subject responds to this threat by preparation for a "fight-flight-holding" action. As a result of careful utilization of this principle, an isolated reaction on the polygraph chart cannot be interpreted as "deception", unless it is accompanied by a comparative lack of reaction on a nearby control question being used.

This brings up the basic classification of questions used as "specific test" components. Each question type should fall generally within one of the following classifications:

1. "Non-lie" questions;
2. "Possible-lie" questions;
3. "Probable-lie" questions; and
4. "Known-lie" questions.

Techniques in general use throughout the polygraph field primarily make use of two of these question categories. The strong "relevant" question falls within the "possible-lie" question classification. The "control" questions fall within the "probable-lie" question classification. This type of question usually embraces a noncompetitive but still stigmatic question toward which the subject's concern will be directed only if he is being truthful to the nearby "relevant" question. Also used within most techniques is the "neutral" question which falls within the "nonlie" question classification. "Known-lie" questions depend on verified items of information unrelated to the relevant issue and are best avoided.

It should be noted that all questions used are reviewed word-for-word, in advance of the beginning of the chart concerned.

Five fundamental steps during the overall polygraph examination may be stated as follows: (1) the obtaining of case information; (2) the selection of the "target", which is the singular relevant issue first to be pursued; (3) the formulation of a carefully structured polygraph test; (4) the administering of such a polygraph test; and (5) the evaluation of all charts concerning the same "target" issue—thus leading to a determination of (a) truth, (b) deception, or (c) an inconclusive result.

In chart interpretation, it is important that a significant number of independent evaluations be made of the relevant questions. One technique involves asking two strong "relevant" questions on each chart, using the following as a basic rule: if subject is attempting deception to one of these two "relevant" questions, he should be attempting deception to the other. Thus three separate evaluations are provided from each of the two question locations—one evaluation for the breathing tracing, one evaluation for the cardio tracing and one evaluation for the galvanic skin response tracing. This results in six separate and independent interpretations per chart.

The generally accepted minimum number of charts for a particular "relevant" target is 2, this totaling 12 separate evaluations. Frequently, three charts are utilized thereby presenting 18 separate opportunities to evaluate the relevant questions. The consistency of reaction, or lack of reaction, assures minimal risk of the possible occurrence of a reaction unrelated to psychophysiological principles embraced by the test structure.

I have not personally made use of "voice-modulation-analysis" devices to date. Although I am therefore in no position to comment on the

questions of validity and reliability, I do believe that certain potential deficiencies can be confronted, specifically as related to minimally adequate technique structures.

In making reference to the previously enumerated "psychophysiological chain of events"—during the asking of a relevant question, I have read no material nor have I heard any arguments, as related to "voice-modulation-analysis", that in any manner circumvent the need for a carefully structured technique. Without such a structured approach there seem to be a number of alternative reasons why a person's voice may modulate because of emotional considerations having little or nothing to do with the fear of detection of deception.

In addition, basically sound "scientific methodology" approaches would seem to dictate the simultaneous use of the proposed innovation along with those indices in conventional use.

If the advocates of the "voice-modulation-analysis" equipment maintain that they are in agreement with the need for a carefully structured technique, I fail to understand how its instruction can be accomplished in a 3-day training course which does not even require prior polygraph training or experience as a prerequisite for attendance.

Aside from the ethical implications, as related to the surreptitiously administered "voice-modulation-analysis" test, which are certainly profound, I must seriously question the possibility of even a minimal adequate technique structure under such conditions.

I certainly must apologize for including so many considerations in such a brief preliminary statement. If it is the wish of this subcommittee, I will be glad to expand upon any of the points involved.

Mr. MOORHEAD. We thank you very much. We may very well ask you some and also ask you to answer some questions in writing at the end of the hearing.

Mr. Backster, on page 3 of your testimony, you say here at the bottom:

> It should be noted that all the questions are reviewed word-for-word, in advance of the beginning of the chart concerned.

Is that reviewed with the subject?

Mr. BACKSTER. Yes; with the subject. In fact, the subject is allowed an opportunity to help formulate the questions so that he certainly will have a basic understanding of each one to be asked. One of the ways we attempt to check this is to have the subject paraphrase for us that which he thinks is meant by the questions considered.

Mr. MOORHEAD. Without any of the measuring devices attached to the subject? This is done first?

Mr. BACKSTER. Yes; the polygraph equipment is not actuated at the time. If a new variation of the question is later added, the attachments may be attached, but they would be inactive during any modification of the question.

Mr. MOORHEAD. Why do you do that?

Mr. BACKSTER. Why do we do the review first?

Mr. MOORHEAD. Why do you go through the questions ahead of time? The element of surprise would seem to be important.

Mr. BACKSTER. Actually, in the structured technique the last thing we really want is the element of surprise. In other words, we are comparing the degree of concern—or the degree of threat-to-well-being

syndrome—as far as the relevant question is concerned, with a control question that has a measured effect, but is not competitive.

If we don't review questions and particularly the control questions, ahead of time, we don't know what psychological "button" we may be touching as far as the subject is concerned, if he hasn't had an opportunity to talk with us about such questions.

I think it is extremely imperative that questions are reviewed ahead of time.

If the subject taking the test is apprehensive that surprise questions may be interjected, he may be apprehensive to all questions. He may be attuned to some kind of outside issue that very much bothers him as compared to the relevant issue.

In fairness to the subject and in fairness to the technique, Mr. Chairman, in my opinion, it is absolutely essential that the questions be carefully reviewed in advance.

Mr. MOORHEAD. Would it not be better for your purposes to keep your basic polygraph and then add on the psychological stress evaluator? Wouldn't that give you an additional tool?

Mr. BACKSTER. Yes; indeed. In fact, all of my remarks as of this moment have not reflected a position for or against the potential of the voice modulation device. My point is that it would seem that the course of action would be to run this device simultaneously, in "real-time," on the same chart, thereby giving it a chance to be examined. There are many indices that might be tapped as far as potential benefit is concerned and this is another one of those, but I think there should be protocol in doing so—and this is just my opinion—as to how it might be done safely.

Mr. MOORHEAD. What Federal agencies sponsor training of their employees at your school?

Mr. BACKSTER. No Federal agencies do. Most Federal agencies—almost without exception—make use of the Fort Gordon School.

Most of our training is for law enforcement at the State and municipal level.

Mr. MOORHEAD. So you don't even teach Federal employees on a refresher course basis?

Mr. BACKSTER. On the work conferences type basis, yes, we do have some individuals from various Federal agencies that attend work conferences. The Fort Gordon course, or at least one portion of the course, is patterned very much around a technique that I have instructed over a period of years called the zone comparison technique. Also, I am at times a guest instructor at the Fort Gordon School.

Mr. MOORHEAD. Is the course at Fort Gordon the same length as yours?

Mr. BACKSTER. No; it is a longer course.

Mr. MOORHEAD. Do you require as a prerequisite to enrollment that students submit to a polygraph test?

Mr. BACKSTER. No, sir. We do not.

Mr. MOORHEAD. Thank you. I think that is all I have right now. Mr. Cornish?

Mr. CORNISH. Yes, thank you, Mr. Chairman.

Mr. Backster does your school qualify for VA approval?

Mr. BACKSTER. No; we have never requested that approval.

Mr. CORNISH. It doesn't?

Mr. BACKSTER. No; it does not.

Mr. CORNISH. Do you know of any schools that do?

Mr. BACKSTER. Polygraph schools?

Mr. CORNISH. Yes.

Mr. BACKSTER. Offhand, I don't, but that doesn't exclude the possibility.

Mr. CORNISH. Now, I notice in your testimony you say the control questions fall within the probable lie question classification. Could you give the subcommittee some examples of control questions?

Mr. BACKSTER. Yes, sir, I could. Let's say in a homicide case, your relevant question would be:

Did you fire one or more of the shots that caused the death of John Jones?

As a control question, we might ask a question such as:

During the first 21 years of your life did you ever deliberately do something to hurt someone who trusted you?

I would agree that this sounds ambiguous and naive, but it does serve the purpose. It is not competitive with the relevant question, but it does draw from the relevant question the artificial stigma that might occur if we did not have the control procedure included.

Mr. CORNISH. Would a good control question be:

Have you ever stolen anything?

Mr. BACKSTER. This in all probability would be a good control question.

Mr. CORNISH. What about:

Have you ever done anything of which you are ashamed?

Mr. BACKSTER. Yes; here again I think we must be careful to match the category of the control question with the relevant issue so that we don't start to unnecessarily embrace some very stigmatic issues. For instance, in a test where theft would be the relevant issue, to include a sex-oriented control question might be disastrous to technique accuracy.

For example, a person may be so sensitive on the sex issue that he would seem truthful regarding any relevant question dealing with his honesty.

We must be careful to match the control question with the relevant issue.

Mr. CORNISH. But the examples I gave would probably——

Mr. BACKSTER. Probably would be probable?

Mr. CORNISH. Well, they would be fairly good control questions?

Mr. BACKSTER. Yes, sir. I think they would be.

Mr. CORNISH. And would you not agree that questions of that nature, which are separate and apart from the incident which is being investigated, would constitute an invasion of privacy?

Mr. BACKSTER. The way I approach the situation is that the control is included as a safety factor for the individual and not as an intrusion on the individual's privacy. I explain very frankly to the individual that this is an opportunity for him to get any sensitivity-type reaction out of his system at a given location on the chart, so that it does not show up as an artificial reaction on the relevant issue.

Again, theoretically it could be somewhat of an invasion of privacy although I would think it a mild one under the circumstance.

Mr. CORNISH. Are you familiar at all with the psychological testing procedures which have gone on in Government, where you take a written examination and you are asked a series of questions?

Mr. BACKSTER. Yes.

Mr. CORNISH. Personal inventory type of questions and that sort of thing, that sort of test?

Mr. BACKSTER. Yes.

Mr. CORNISH. Where you are asked questions such as, "Do you believe in God?" and that sort of thing?

Mr. BACKSTER. In my acquaintanceship with those questions and tests as such, I wasn't confronted with that kind of question.

Mr. CORNISH. But do you think that there is any parallel between that type of thing and the type of thing that I was describing?

Mr. BACKSTER. I think that when we are talking about believing in God, we are certainly over into the realm of spirituality and not materialism. We were talking about stealing something, and that is a different category.

Mr. CORNISH. As a matter of fact, the control questions which I have cited to you as examples were questions on psychological tests, on written tests, that were given to Government employees. That is one of the reasons I asked you if they were probable control questions.

Mr. BACKSTER. The last question you mentioned about believing in God would certainly not qualify by any stretch of the imagination for a polygraph test.

Mr. CORNISH. Well, I will accept your statement on that, but the other questions were definite questions that were asked on such an examination.

Were you at the hearing this morning?

Mr. BACKSTER. Yes, sir, I was.

Mr. CORNISH. And you may recall the testimony that indeed there were misuses of polygraphs and abuses of polygraphs. As a matter of fact, the association had received approximately, as I recall it, 10 complaints a year or something of that magnitude. In your experience, what abuses of polygraphs have you seen or heard about or have knowledge of?

Mr. BACKSTER. Well, first I would have to see the charts of an individual undergoing the process of the polygraph examination. If a particular example were shown to me and I could look at the charts and try to see how the polygraph examiner arrived at his determination—or if he had grounds or a basis for arriving at his determination—I think I could answer that better. But just to state——

Mr. CORNISH. Well, let me give you some specific examples. How about the surprise question, have you heard of abuses in that category?

Mr. BACKSTER. In our instruction, we forbid the asking of surprise questions. Yes, sir, I think that earlier in the history of polygraph usage, this was something that was utilized. In other words, the surprise "control" question. It created, in my opinion, a great deal of harm because a subject couldn't volunteer for a polygraph examination and know in advance the scope of the examination. In my opinion, I think this was wrong.

Mr. CORNISH. Actually, wouldn't you agree that when there are abuses and perhaps operators who do not have high standards, that many of these abuses take place during the interrogation of women? I am speaking about sex-oriented questions.

Mr. BACKSTER. From my personal experience, I can't comment on that. In other words, I don't know that to be true.

Mr. CORNISH. You never heard of any instances?

Mr. BACKSTER. I think your question was most of the abuses take place——

Mr. CORNISH. Well, I will change it then to some of them.

Mr. BACKSTER. I have, yes, regarding some of the abuses. In other words, over a period of years——

Mr. CORNISH. You wouldn't doubt that?

Mr. BACKSTER. I wouldn't doubt that.

Mr. CORNISH. In fact, and not to denigrate the police, but that might be the type of abuse which would occur in a local police department from community to community at times?

Mr. BACKSTER. It certainly would be a possibility.

Mr. CORNISH. Do you know of any other types of abuse involving polygraphs, such as the deliberate deception on the part of the polygraph examiner.

Mr. BACKSTER. No, I am not personally aware of that, although again I would concede it to be a possibility.

Mr. CORNISH. You are certainly aware of situations where polygraph exams have been used as a form of mental third degree where a person has blind faith, let us say, in the machine and is told that the machine shows that he is lying and at that moment he blurts out his confession? Is that an unusual occurrence?

Mr. BACKSTER. You are speaking again of possibilities regarding other examiners? Not in my personal experience——

Mr. CORNISH. Yes, but these are not way-out possibilities, are they?

Mr. BACKSTER. No. I again am quick to concede that these are possibilities. I am not denying that these things could possibly go on, but——

Mr. CORNISH. Have you heard of it happening?

Mr. BACKSTER. I have heard secondhand and thirdhand, yes.

Mr. CORNISH. Have you ever heard of a situation where they might examine, say 19 people under a polygraph examination, say for pilferage from a store or something like that, and tell each one of the persons that the machine shows that they are lying?

Mr. BACKSTER. No, I haven't heard of that.

Mr. CORNISH. Nothing like that?

Mr. BACKSTER. You mean to tell the person taking the test that, and know full well that the charts did not show that, but tell them that? In other words, the investigators are guilty of lying? I don't have personal knowledge of that. That certainly would be an extreme abuse of the polygraph.

Mr. CORNISH. But you have never heard of anything like that happening?

Mr. BACKSTER. I have heard rumors, but I would certainly hate to make that a matter of congressional documentation based on very secondhand or thirdhand rumors.

Mr. CORNISH. Do you agree with some of the thrust of the testimony this morning, that one of the reasons why we should have polygraphs is that we have a means whereby somebody can prove their innocence?

Mr. BACKSTER. I agree with the position that I never realized there was a necessity for people to have to prove their innocence.

Mr. CORNISH. You don't know of any court in the country where a defendant has to prove his innocence?

Mr. BACKSTER. No, sir; I do not.

Mr. CORNISH. Thank you, Mr. Chairman.

Mr. MOORHEAD. Mr. Daniels?

Mr. DANIELS. No questions.

Mr. MOORHEAD. Mr. Phillips?

Mr. PHILLIPS. A couple of questions, Mr. Chairman.

Mr. MOORHEAD. Well, try to keep it brief because we may have to vote soon.

Mr. PHILLIPS. Mr. Backster, I notice in your testimony and also in some of the testimony this morning the use of the word "deception" as the opposite to the word "truth." Why is that word used, rather than "lie" or "falsehood" or something that is more direct?

Mr. BACKSTER. I am not quite sure that I am one of those who has stressed such reservation. In fact, by the very name of my school—the Backster School of Lie Detection—one can see that I haven't attempted to utilize the alternate. Rather than "the Backster School of Truth Detection," it is the Backster School of Lie Detection.

Mr. PHILLIPS. Here on page 4 at the top of, page 5 I mean, you used: "Leading to the determination of (a) truth; (b) deception; or (c) an inconclusive result."

It just seems strange because we heard that same term several times this morning. It almost seems like there is a reluctance to say that the purpose of the device is to find out if someone is lying, and yet your school is the lie detection school.

Mr. BACKSTER. The example you mentioned I think is an excellent example. In fact, we are not afraid to determine if somebody is attempting deception.

I use the term "attempting deception" rather than "lying" but I am using them interchangeably.

Mr. PHILLIPS. In other words, you are saying it is just semantics?

Mr. BACKSTER. In the comparison of those two terms, I would say yes.

Mr. PHILLIPS. Well, I was wondering if really what this means is the use of the polygraph is really in isolating areas of deception by the use of these control questions but not necessarily pinning down clearly in all cases whether a person is telling the truth or lying.

Mr. BACKSTER. I would say, based upon the structured system that I use, that is not a correct statement. One of the procedures we use as part of "zone-comparison" polygraph testing involves selection of the "target" to be pursued. We exert an effort to select the strongest and most imperative target to be pursued, by evaluation on the basis of these factors. The reason I hesitated to go into it too deeply is that I did so 10 years ago when I testified before this subcommittee.

We numerically evaluate the adequacy of case information, the strength of the issue, and the distinctness of the issue. We like to see as high a numerical score as possible on those three preliminary considerations. We get right to the point and don't dodge around the issue of deception at all.

The target used is the target that is the strongest one possible. For instance, in a rape-murder-robbery case, we would select one of those targets and get right to the point and in no way hedge on a determination.

Mr. PHILLIPS. I take it you have experience as a polygraph operator as well as running a school?

Mr. BACKSTER. Yes, indeed; 25 years, in fact.

Mr. PHILLIPS. Have you ever come across a case where a pathological liar or a compulsive liar was the subject of one of your tests? Is it possible that an individual, because of his own psychological makeup, his own personality traits, could really believe so strongly in what he was saying, that what he was saying was the truth, that he could fool the polygraph?

Mr. BACKSTER. In regard to the pathological liar, we have heard through the years a good bit about this, but I would question whether it is in a realistic sense probable.

I would say that where a person can start to believe his own lie would be where the "distinctness of issue" is getting very, very low on our evaluation scale and where the "case information" is very hazy.

Under such circumstances, a person may rationalize. In other words, our "distinctness of issue" is an antirational factor.

I would estimate that there are a great number of habitual liars, but I have yet to be confronted with the first person I thought to be truly a pathological liar. That is only my own experience.

Mr. PHILLIPS. How would you tell?

Mr. BACKSTER. Here again, only by those cases that are verified in some manner that would pinpoint this condition.

I might not know, so I must admit the possibility. But you are asking me for a specific example and——

Mr. PHILLIPS. But you never personally have——

Mr. BACKSTER. No; not personally.

Mr. PHILLIPS [continuing]. Encountered that situation?

Mr. BACKSTER. Not personally.

Mr. PHILLIPS. Has there been any research or scientific articles on this aspect of the problem?

Mr. BACKSTER. Not specifically addressed to that particular problem, that I know of. There may be articles in the field of general psychology, but I think the idea is to find pathological liars that would be part of that research sample.

Mr. PHILLIPS. The problem would be to get him to admit it. Thank you, Mr. Chairman.

Mr. MOORHEAD. Mr. Stettner?

Mr. STETTNER. Just one question. In the preparation of the individual for the test, in this preliminary discussion, is it still a matter of convincing the individual that the machine itself is infallible?

Mr. BACKSTER. In my technique this is not true. This idea of having to convince the person of the infallibility of the instrument should not have a significant bearing as to the usefulness of the polygraph technique.

A person, let's say, who had experienced another polygraph test—where he was able to fool the examiner—I think he enters into his next test perhaps a little less apprehensive as far as the fear of detection is concerned. This should and perhaps would reduce the magnitude of reaction but not eliminate the reaction.

In our training, we try to stress the reading of subtle chart reactions as well. The fact that a person's subtlety of reaction, or magnitude of reaction, is altered should not interfere with the determination.

Mr. CORNISH. Mr. Chairman?

Mr. MOORHEAD. Mr. Cornish?

Mr. CORNISH. Do I understand that you are doing some sort of experimentation with plants?

Mr. BACKSTER. Your understanding is correct. The thing I did, and it was 8 years ago, was attach the electronic or galvanic skin response section of the polygraph to a plant leaf. This led to, as a matter of fact, 8 years of exploration where we found that we can use a patch of the plant leaf, or we can grind the leaf up and test the cellular response. From this we converted to the use of the electroencephalograph to take biological readings. At the present, we are over into the animal life field, at cellular level.

I suspect that we are going to be able to show that cells, taken from the human body and put in one incubator, and additional cells taken from the same source and put in another incubator, will show communication capability from one part of the sample to the other. This ties to something which I think could be important in the field of immunology.

Since you brought this up, so far as my history of involvement in this is concerned, I got quite a bit of kidding initially. After the initial observation, I immediately estimated whether it would be beneficial to pursue the matter and then decided to put it before the scientific and academic communities.

I have here, which I would like to submit to the subcommittee, a partial list of lectures to the scientific and academic communities over a period of 8 years. All of these relate to this subject. I think the amount of interest and the frequency of the invitations to participate by giving symposiums, seminars, and so on, will perhaps indicate their interest.

If I might submit this?

Mr. MOORHEAD. Yes; the committee would be glad to receive that.

[The material follows:]

BACKSTER RESEARCH FOUNDATION, INC.,
New York, N.Y.

PARTIAL LIST OF LECTURES TO "SCIENTIFIC-ACADEMIC" GROUP BY CLEVE BACKSTER

March 24, 1969: University of Pennsylvania—Philadelphia, Pa. (landscape architecture department).

August 30, 1969: American Association for Humanistic Psychology—Silver Spring, Md. (annual meeting).

October 16, 1969: Rosary Hill College—Buffalo, N.Y., (senior class).

November 3, 1969: Yale University—New Haven, Conn. (Linguistic Club).

January 20, 1970: McGill University—Montreal, Canada (Sigma Xi—Honor Society for Science).

January 30, 1970: University of South Carolina—Columbia, S.C. (garden symposium).

February 20, 1970: Newark College for Engineering—Newark, N.J. (alumni association).

February 25, 1970: Scientific Research Society of America—Bayside, Long Island, N.Y. (General Telephone & Electronics Laboratories, Inc.).

April 29, 1970: Western Electric-Bell Telephone Labs—Whippany, N.J. (13th engineering symposium).

July 27, 1970: Instrument Society of America—Hobart & William Smith Colleges, Geneva, N.Y. (research conference on instrumentation science).

August 19, 1970: Central Washington State College—Ellensberg, Wash. (conference on integrative education).

October 14, 1970: Scientific Research Society of America—Nutley, N.J. (Hoffman-LaRoche).
October 28, 1970: North Carolina State University—Raleigh, N.C. (botany seminar).
February 3, 1971: Scientific Research Society of America—Sterling Forest, N.Y. (International Nickel).
February 10, 1971: Bell Telephone Laboratories—Chicago, Ill. (automatic switching division conference).
March 31, 1971: Immaculate Conception Seminary—Conception, Mo. (theology seminar).
April 12, 1971: Massachusetts Institute of Technology—Cambridge, Mass. (course on ecological survival).
April 30, 1971: Dartmouth College—Hanover, N.H. (biology seminar).
July 13, 1971: University of Georgia—Athens, Ga. (garden symposium).
November 7, 1971: Science Teachers Association of Ontario—Ottawa, Canada. (fall science teachers conference).
November 10, 1971: Lake Forest College—Lake Forest, Ill. (Beta, Beta, Beta—Honor Society for Biology).
March 1, 1972: Drexel University—Philadelphia, Pa. (department of architecture).
March 21, 1972: Scientific Research Society of America—Wilmington, Del. (Dupont Experimental Station).
May 4, 1972: Bowman Gray School of Medicine (Wake Forest University) Winston-Salem, N.C. (Sigma Xi Honor Society for Science).
September 28, 1972: Bell Laboratories—Whippany, N.J. (communications conference).
October 21, 1972: American Academy of Psychotherapists—New York City (annual conference).
November 11, 1972: American College of Medicine Hypnotists—Las Vegas, Nev., (17th annual meeting).
February 6, 1973; Southern Illinois University—Carbondale, Ill. (botany—physiology colloquium) (also Sigma Xi—evening).
February 20, 1973: University of Michigan—Ann Arbor, Mich., (Department of Botany) (also "Future Worlds Series"—evening).
June 18–24, 1973: Czechoslovakian Society for Science and Technology—Prague, Czechoslovakia. (International Conference on Psychotronic Research).
March 9, 1974: University of Missouri—St. Louis, Mo. (science and mankind conference).
April 3, 1974: University of Wisconsin—Milwaukee, Wis., (botany-zoology colloquium).
May 13, 1974: National Aeronautics and Space Administration—Greenbelt, Md., (Goddard Space Flight Center Engineering Colloquium).
May 19–24, 1974: Brunnel University—Uxbridge, England (conference—frontiers of science and medicine).

Mr. CORNISH. The reason I bring this subject up is not to go into detail, but there is a great deal of interest in so-called communication with plants and that sort of thing these days. Can you tell me whether you actually attach a polygraph to a plant?

Mr. BACKSTER. No, I used the galvanic skin response electrodes only, which enabled me to stumble upon the idea that there was electrical activity at the cellular level. I then converted to the use of the electroencephalograph. I think there has been a fair amount of interest—in fact, even the housewives sort of think the research is pertinent to some of the things that they have been thinking right along.

But I had second thoughts initially, I think, on this involvement. It took a little courage of my convictions to pursue it. Certainly, my reputation within the polygraph field was at stake. I think by looking at this list you can see the representative interest current in the scientific and academic communities.

Mr. PHILLIPS. Mr. Chairman, I have one other question that I don't think has been asked of any of the polygraph witnesses about the

machines themselves. How many manufacturers of polygraph equipment are there?

Mr. BACKSTER. I would say there are two prime manufacturers. At the time of the 1964 hearings, the two manufacturers were the C. H. Stoelting Co. and Associated Research. Associated Research has now discontinued their line of polygraph equipment and Lafayette Instrument Co., has, I think, sort of filled the vacuum as far as competitive production of the instrumentation is concerned.

Mr. PHILLIPS. How is the equipment tested? Is there some standard that is used prior to a test on a subject where you can make sure that the machine is in operating order?

Mr. BACKSTER. Yes.

Mr. PHILLIPS. Is there a standard series of tests that the manufacturer prescibes for the equipment?

Mr. BACKSTER. Well, there are sensitivity tests that are made of the equipment at the manufacturing plant and then, if the examiner wants to get his trouble-shooting manual out and see how far he must stretch the pneumograph tube in order to get a certain linear change on the chart, he can do that—but one of the sensitivity checks that is more often used involves the galvanic skin response section. There is a built-in button on the panel of the instrument where—before every test—the instrument sensitivity can be measured by merely pushing the button. That section is the one that most often needs checking but can be easily double checked to see if one has a deficiency related to the subject or a deficiency related to the instrumentation.

Mr. PHILLIPS. Thank you, Mr. Chairman. I thought we should have something like that on the record.

Mr. MOORHEAD. Thank you very much, Mr. Backster. We appreciate your testimony.

The subcommittee would now like to hear from Mr. Leo Pellerzi, general counsel of the American Federation of Government Employees.

We are pleased to have you with us.

STATEMENT OF LEO PELLERZI, GENERAL COUNSEL, AMERICAN FEDERATION OF GOVERNMENT EMPLOYEES, WASHINGTON, D.C.

Mr. PELLERZI. Thank you, Mr. Chairman. I am delighted to be here. I bring you the best regards from our president, Mr. Webber, who regretfully couldn't be here today to present this statement. I would like, with your permission, to present it on his behalf.

Mr. MOORHEAD. We will be pleased to receive it. I also notice that you had Mr. James Lynch of your organization in the committee room this morning.

Mr. PELLERZI. Yes; he was. He had intended to be here too.

Mr. MOORHEAD. He is very important because he comes from the city of Pittsburgh.

Mr. PELLERZI. Yes; I understand that. I intended to be here too, but some other legal matters kept me from being here.

We think these matters are critically important.

On behalf of the American Federation of Government Employees representing over 650,000 Federal employees in exclusive recognition units, I wish to express appreciation to this subcommittee and its distinguished chairman, Congressman Moorhead, for scheduling hear-

ings on the use of polygraphs and similar devices by agencies of the Federal Government.

The last published reports of this subcommittee in 1966—and I believe those hearings which were presided over by John Moss, if memory serves—served the signal purpose of bringing into focus and to public attention not only the extent of polygraph use by Federal agencies but a comprehensive overview of the procedures, methods of their use, and I might add abuse, and the relative capabilities of both the operators and the machines as to their effectiveness and reliability.

The committee at the time made a series of recommendations that the Government initiate comprehensive research to determine the validity and reliability of polygraph examinations, to improve the training and the qualifications of the operators, to restrict the use of two-way mirrors and recording devices in connection with polygraph examinations, and most importantly, to prohibit the use of polygraphs in all but the most serious national security and criminal cases, to guarantee that polygraph examinations be, in fact, voluntary, and to ensure that refusal to take an examination not constitute prejudice or be made part of an individual's record except in the most serious national security cases.

We believe, based on our experiences as reflected through our membership, that these subcommittee hearings and recommendations have had a very salutary and positive effect and motivated constructive changes along the lines of the committee's recommendations.

We do not believe, however, that sufficient progress has been made or that the committee's recommendations in 1966 went far enough. Our union—and I want to emphasize this, Mr. Chairman—unequivocally supports the legitimate and narrowly defined needs of national security and fully understands the necessity for those agencies charged with national security and national security intelligence and counter intelligence responsibilities, consistent with our constitutional guarantees, to effectively employ modern technology in the furtherance of their work.

We do not believe, however, that the polygraph and related devices have any purpose whatsoever in general Government personnel operations either for pre-employment screening or post employment use related to any matter other than specific job performance of a highly select segment of the Federal work force involved in the most sensitive national security pursuits.

Many of the abuses uncovered by the subcommittee in the earlier hearings, such as the use of two-way mirrors and recording devices—and I might add the injection of sex questions to female applicants and others, whether they were disclosed or not, they were occurring at that time—during pre-employment examinations stemmed from the indiscriminate use of the device which was unjustified in the first instance.

We note with limited satisfaction that the Civil Service Commission, subsequent to the subcommittee's 1966 hearing, amended its regulations to bar the use of polygraphs to screen applicants in the competitive service, except for agencies which have an intelligence or counter-intelligence mission directly affecting the national security, which first obtain approval from the chairman of the Civil Service Commission for the use of the polygraph.

It is important to understand that even this forward step applies

only to employees in the competitive service over which the Commission has jurisdiction and does not cover a significant part of the Federal work force which is in the excepted service.

We firmly believe that, because short of the President, there is no single authority in the executive branch authorized to promulgate and supervise appropriate regulations controlling the use of polygraphs, legislation by the Congress is essential.

Such legislation should contain an absolute bar against the conduct of polygraph examination of Federal employees except in narrowly defined national security cases and then only with the employee's consent. Since the type of cases we have in mind are such that they would, in almost all instances, involve possible violations of criminal statutes, the legislation should also provide that absolutely no inference adverse to the employee should be drawn from his refusal to submit to the polygraph examination. Clearly in such instances this safeguard is required by the Constitution.

We are deeply concerned about the invasion of privacy implications and the pressures toward self-incrimination which stem from use of polygraphs. Leaving aside the questionable reliability of the technology and the deficiencies in administration of the examinations, which are obviously subject to further development and improvement, the conditions under which abuses occur and which call forth the use of polygraphs on Federal employees are often highly charged investigations involving security breaches, or leaks of classified information, which initially at least, are conducted under partial or total secrecy.

In such circumstances, the compulsion upon the employee to consent is almost overpowering. There is the unwarranted—and I want to repeat that, Mr. Chairman—unwarranted assumption present that the polygraph will somehow sort out the innocent from the guilty, and that if an employee refuses to submit, he is hiding his guilt.

While the polygraph examination is not a surreptitious surveillance of the individual, like bugging or wiretapping or the use of two-way mirrors, the use to which the results are put can have the same deleterious effect unless this use is strictly controlled.

Accordingly, assuming that in narrowly justified circumstances polygraph examinations are warranted, we recommend that they be conditioned unequivocally by law to require consent of the individual examined and to insure the right to have an attorney, a doctor, or both, or another representative of his choice present at all times during the examination.

Further, such legislation should restrict the use of the result to the specified purpose for which it was taken and to which the employee has consented, and prohibit the use or distribution of such results for any other purpose.

We are not now in a position to contest the assertions that the pressures placed upon certain elements of the intelligence and security apparatus of the Government are such as to warrant the limited and selected use of polygraphs and other technological devices in the public interest. However, we believe the outer limits of that use and the procedural safeguards discussed above should be established under congressional standards if proliferation of use and abuse in application is to be avoided.

The liberty interests—and I want to stress that here again, Mr.

Chairman—of Federal employees affected by the use of such technological devices by the Government on its own employees, is sufficient to require this application of the principle of checks and balances both in the process of authorization and in the process of utilization. This can only be accomplished by legislation which we hope will be forthcoming as a result of these hearings.

Let me hasten to add, Mr. Chairman, we realize that your committee does not exercise substantive jurisdiction, but we would hope that as a result of your study, there would be recommendations for control of these devices. We are certainly concerned about the invasion of privacy implications that these devices represent when they are used by the Government against Government employees.

That concludes my statement, Mr. Chairman. I would be happy to answer any questions you may have. With your permission, I would like to make one comment on a document that was submitted earlier to the hearing, which I picked up and read hurriedly while I was waiting to take the chair. May I proceed?

Mr. MOORHEAD. Yes, please proceed.

Mr. PELLERZI. This was a document submitted to the committee this morning called "The Polygraph Technique," captioned "Dedicated to Man's Possessive Right To Verify the Truth," and submitted by the American Polygraph Association, which I assume is a trade association promoting the use of polygraphs. Its contents reflect to my mind the blind type of one-sided mentality that has led to not only a proliferate use of the polygraph but leads to the abuses of the polygraph.

We don't question that scientifically there is a stream of light to be developed here toward ascertaining man's reaction toward telling events as they may have been. But the statement I refer to on page 6 of that document says, and I quote: "Labor"—and I guess that would include the AFGE because we are a labor union, and indeed, we are the largest in the Federal sector—"Labor has consistently opposed and obstructed efforts to protect the public rights and the personal rights of all citizens by this means. Instead of 'personal rights,' are these representatives of labor really not advocating 'the right to lie, cheat, and steal without discovery.'

"Reasonable and honest people can supply their own answer without our help."

Well, I am not calling upon this association for any help, Mr. Chairman, but I would like to supply a partial answer to that. That reflects to me a total ignorance of our basic charters of Government and of social policy. It reflects clearly the false assumption upon which many polygraph operations are predicated, and that is that the person being examined is guilty until he can be exculpated by the use of the machine. And as a lawyer and as a former public servant and as a citizen, I find that type of thesis and that type of mentality shocking.

And I can't speak for all labor here, but I think our statement made it very clear that we are not anti-intellectual, we are not opposed to the advance of science, but what we are opposed to is just exactly this type of thinking that creates an impression that somehow here is a device that is going to sort out the innocent from the guilty and that unless you submit to it, you must be attempting to hide something. And it is exactly that propaganda that has been promulgated by associations, I assume such as this one, which has led to tremendous abuse of the polygraph.

And I think the commercial exploitation of the polygraph by those who either make them, sell them, or operate them, are probably one of the most serious detriments to the scientific advancement of that device. If the labor movement stands against invasion of privacy, denial of individual constitutional rights, they do so on the highest principles with nothing to gain except observance of the role of law. I will leave to others to judge whether labor's interest or the salesmen of polygraph services best reflect the public interest in their respective positions.

Mr. MOORHEAD. I would like to say, Mr. Pellerzi, I think that your statement is an excellent one. While I don't believe that labor organizations need any defense before this subcommittee, you made a very eloquent statement on behalf of all organized labor.

Mr. PELLERZI. Thank you, Mr. Chairman.

Mr. MOORHEAD. I would like to ask you as a lawyer if you can help the subcommittee—perhaps now, or maybe after a chance to reflect on it. You talk about the most serious national security questions and then you talk about narrowly defined national security cases. Any help that you can give us with language to define "national security" very narrowly would be appreciated, not only in connection with this legislation but with some other legislation before this committee. We have been wrestling with that matter in the Freedom of Information Act, in classification legislation, and in access of Congress to information. We haven't been able to devise any language that completely satisfies all of the members of this subcommittee.

Mr. PELLERZI. I have wrestled with it too, Mr. Chairman, and I know of your travail and appreciate it very much. The problem is, quite frankly one that you have to go to the people involved in those pursuits to get some idea of what it is, of what is national security, and when you reach a certain point of analysis in those colloquies—and I guess you have confronted that issue the same as I have—you get to the point where they can't tell you about it because if they did it would be detrimental to the national security interests.

So you get to sort of a blind article of faith there. But I would off the top, Mr. Chairman, say that we ought to narrow it down to those areas where they can't tell us anything about it, when we get it narrowed down to that, then I think that is as far as you can go in view of the separation of the three branches of Government. At that point, I think you probably got it narrowed down to the irreducible minimum under the separation of powers doctrine. But I would reduce it to the irreducible minimum, Mr. Chairman, any way that you could do that.

I have wrestled with that problem in the executive branch and that is where you come out eventually. You get to the point where you can't get beyond a certain informational barrier because of that limitation. And I would get to that barrier from the standpoint of the Congress and I would limit it there, unless there is scientific evidence forthcoming that shows a greater reliability factor.

Mr. MOORHEAD. Are there any questions that can't be asked in writing of Mr. Pellerzi?

Hearing none, would you answer questions submitted to you in writing?

Mr. PELLERZI. Yes; I would be glad to be of any help we can to the chairman and the subcommittee.

[The questions and answers follow:]

Question

1. In what circumstances and under what conditions would you advise a Federal employee that he submit to a polygraph test?

Answer

I would advise the employee to submit to a polygraph test if:

- a Federal statute clearly authorized the Federal agency head concerned to request employees of that agency to submit voluntarily to polygraph tests under the precise circumstances and conditions involved (which conditions and circumstances should be limited by the statute to narrowly defined and very serious national security matters).

- the statute was Constitutional and neither the statute nor its application in the particular case infringed any of the employee's constitutional rights of privacy, free speech, self-incrimination, rights to confront one's accuser, etc., under the First, Fourth, Fifth, and Sixth Amendments, or other clauses of the Constitution.

- the agency head implemented the statute in strict accordance with the authorizing statute, with other applicable laws, and with the terms of relevant collective bargaining agreements.

- the employee's decision to submit to the test was completely voluntary, with his or her consent being given in writing, and after being furnished in writing a certification signed by the head of the agency guaranteeing the employee that no compulsion would be applied, that no penalty or prejudice would result if he or she refused to participate in the test, and that no adverse inferences would be drawn from such

refusal (particularly where alleged criminal violations were being investigated).

- the employee was invited to have legal counsel or other representation present during (1) any discussions leading up to the agreement or refusal to take the test; (2) the test itself; and (3) any discussions of results, evaluation, or possible action occurring after the test.

- the employee and his representative were (1) invited to review in advance all questions to be asked during the test; and (2) fully informed on the qualifications of the test personnel and the equipment and procedures to be used, and given the time necessary to assure that the highest professional standards were being followed in all respects.

- there was a clear understanding and commitment as to the specific, limited, one-time purpose for which the test was given; an unequivocal rule against the distribution, dissemination, or use of the test results for any other purpose than that freely consented to by the employee; and a specification of the place and time period of retention, and the proposed date and method of disposal, of the test results and evaluations.

- the employee and his representative were authorized at any time to ascertain to their satisfaction, that these commitments had, in fact, been carried out, and that no unknown penalties or adverse inferences had in fact occurred.

- the use of lie detectors and like devices was subject by agency policy to collective bargaining agreement.

Question

2. With reference to your statement that the outer limits of the use of polygraphs and other technological devices be established under Congressional standards, to avoid proliferation of use and abuse, what would you suggest as standards applicable to:

a. consent by the individual;
b. qualifications of examiners;
c. conduct of examiners while administering the tests;
d. mechanical and electronic testing of equipment to be used;
e. physical characteristics of room in which test is given;
f. recording the test being administered;
g. discussions of test results with individuals tested; and
h. retention of and limits on test records and results being disseminated to others?

Answer

a. The answer to this was given above. A polygraph test, in narrowly defined and very serious national security cases, should be given only with the written consent of the employee and only after he or she has been furnished with a written certification from the head of the agency that there will be absolutely no compulsion applied to take the test nor any penalty or adverse inference drawn as a result of refusal to take the test.

b.) These professional and technical standards should be
c.) worked out jointly by such organizations as the American
d.) Bar Association and the National Academy of Sciences, in
e.) consultation with the AFGE, the ACLU, the National Civil Service League, and others, and recommended to the Committee on Government Operations.

f. The full test results should be made available to, and discussed with, the employee and his representative. He should be allowed to call in his own or an independent expert to evaluate the test structure, procedures, results, analysis, etc. - and especially the critical points.

g. The answer was given above to this. The test records should be used only for the specific, limited, one-time purpose freely consented to by the employee. They should not be used for any other purpose. They should be destroyed as soon as that purpose is served. They should not be disseminated to anyone. And the employee should be able to acertain that these actions had been, in fact, carried out.

Question

3. Do you believe that individuals are being unduly influenced to submit to polygraph examinations, to demonstrate their innocence, by the statement that

> "it is the belief of most polygraph examiners that their errors generally favor the guilty subject, i.e., that an examiner is more inclined to report a guilty subject innocent than he is to report an innocent subject guilty."?

Answer

Yes.

Mr. MOORHEAD. All right. Then, thank you very much.

This committee will stand in recess for approximately 30 minutes for votes on the House floor.

[Brief recess.]

Mr. MOORHEAD. The Subcommittee on Foreign Operations and Government Information will please come to order.

The subcommittee would now like to extend apologies to Mr. Fred Fuller for delay here today and welcome him to the subcommittee.

STATEMENT OF FRED H. FULLER, PRESIDENT, TECHNICAL DEVELOPMENT, INC., BETHESDA, MD.

Mr. FULLER. Thank you.

I am Fred Fuller, president of Technical Development, Inc., Bethesda, Md. I am the inventor of record of the Mark II voice analyzer and the voice stress analyzer and have submitted disclosures for several other devices concerned with extraction of vocalization parameters.

In 1963, I directed research on the capability of a speech parameter to differentiate truthful from deceitful responses. This parameter measured the energy changes in the lower and midrange speech frequencies. During the period 1964 to 1965, I did further research to determine the optimum frequencies to use in this parameter.

In 1969, I obtained a purchase order from the Limited War Laboratory, U.S. Army, to validate this parameter using tape recordings of edited polygraph examinations. Encouraging results were obtained despite the very poor quality of the tapes.

A second contract was obtained in 1970 with the same agency whose primary objective was to develop the instrumentation necessary to fully automate the extractings and processing of the speech parameter. This was the voice stress analyzer.

A third contract was awarded in 1971 to obtain a sufficient number of polygraph tape recordings to validate the technique. A series of weaknesses were shown in the speech parameter and its instrumentation: (1) the parameter required low noise ambient conditions and a strong speech signal; (2) a high quality tape recorder was required; and (3) the instrumentation required electronic components which were temperature sensitive and circuits which required frequent recalibration.

Because of these shortcomings, I began to explore other possibilities. In 1965 and 1966, I had performed research concerning the possibility of detecting newborn mentally retarded infants through analysis of their cry characteristics. Successful results were obtained using a tremolo or vibrato measure.

This consisted of electronically counting the rapid variations in amplitude that occurred in the basic carrier wave. In 1972, I had an instrument built, the prototype of the Mark II voice analyzer, which electronically extracted this tremolo from speech and provided an instantaneous count and display of this measure. Preliminary tests showed the measure to shift with changes in emotional stress.

In January or February of 1973, Technical Development, Inc., received a purchase order from the Land Warfare Laboratory, U.S. Army to process approximately 50 of the polygraph examinations

which had been conducted and tape recorded by Dr. Kubis' staff as part of their study. TDI delivered in February or March 1973 computer punch cards containing all voice values obtained from these tape recordings.

In April LWL supplied to TDI identification of roles of 45 of the subjects. During the spring of 1973, an optimization effort was made to determine the best logic to use in evaluating the Mark II voice data in assessing deceit and guilt.

Beginning in the summer of 1973, a series of validation studies were performed, and are continuing, of the Mark II accuracy. These studies have been performed in cooperation with well known polygraphers and polygraph firms.

Tape recordings were provided of the polygraph examinations; these recordings were processed and blind evaluations made as to the deception of the subject based solely upon the voice values. Detailed comparisons and records were kept by both the cooperating firms and TDI of approximately 150 cases, although approximately 500 cases have been documented.

The results of all testing to date shows the Mark II to be as accurate as polygraph. There was no significant difference between the accuracy obtained using the Mark II and that obtained by using polygraph in Dr. Kubis' work.

We have found a 93 percent match between overevaluations and that of the polygrapher in actual examinations of specific crimes. This indicates that the Mark II is at least as good, if not better, since the polygrapher studies and interrogates his subject in a face-to-face meeting for periods up to an hour in duration. We have approximately 5 minutes of tape recording, yet have done as well as polygraph in our evaluation.

It is my belief that the Mark II, since it provides a precise numerical value and reduces the uncertainty of assessing the presence or degree of emotional reaction offers a significant advance over any other method today. While the assessment of stress reaction has been tremendously simplified, a novice cannot use this instrument for lie detection.

The framing of the questions and particularly the review and clarification of results between the examiner and the subject after the testing requires the skill of an interrogator trained on the psychology of lie detection examinations.

While the Mark II can provide data on the stress occurring in dialog, our experience to date shows that this is an exceedingly complex area. Patterns of stress reactions occur but, at present, we cannot be certain as to their meanings. Therefore, we do not believe that the Mark II or any other instrument currently available can analyze routine dialogs and determine deception based upon our present knowledge.

I have provided to this subcommittee a copy of our studies conducted to date.

[These studies are in the subcommittee's files.]

Mr. FULLER. If there are any questions concerning these studies or my statement today, I will be pleased to answer your questions.

Mr. MOORHEAD. Thank you very much, Mr. Fuller. We will be pleased to receive those.

Dektor provided us with a chart, which I ask unanimous consent to be included in the record at this point.

[The material follows:]

DEKTOR PSE CHART PATTERNS

Normal

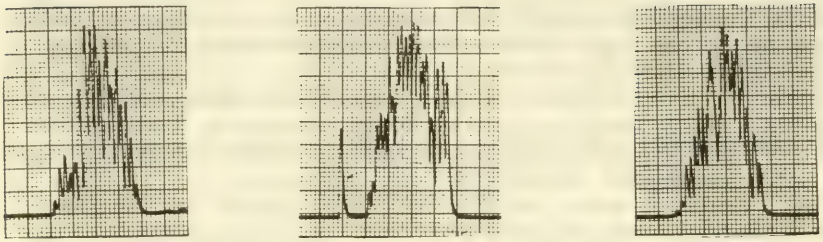

Figure 1 shows examples of PSE patterns produced in a person not experiencing any appreciable stress. Notice how irregular the cycles are and how the over all configuration resembles a wave.

Stress

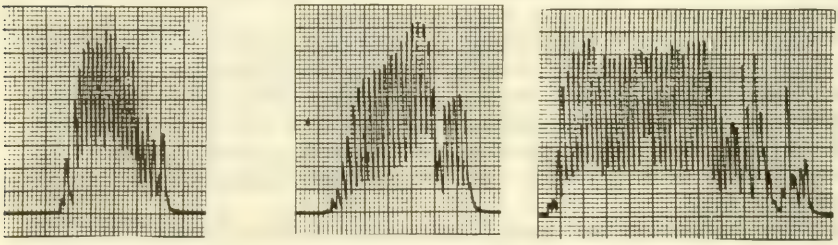

Figure 2 illustrates charted responses of persons under stress. These patterns show a degree of rectilinearity proportionate to the degree of stress present. The charts here show, from left to right, increasing degrees of stress.

Mr. MOORHEAD. It shows a normal and a stress situation. Now can you give us the equivalent from your Mark II?

Mr. FULLER. Well, we generate a number and the number normally runs between 10 and 70. The higher the number, the greater the stress.

But we do have, and I did submit, a document of our work, which does include this type of data.

Mr. MOORHEAD. Just so we will be able to understand it, would you?

Mr. FULLER. Yes, sir.

Mr. MOORHEAD. Now, as I understand your testimony, to do a lie detector job, you have to have skilled examiners. Are the questions phrased the same way that you would phrase questions if you were dealing with a polygraph machine—the control question and so on?

Mr. FULLER. Yes, sir. There has to be a use of controls. All of these devices are all in a sense inferential devices, that is, they measure stress through which you infer deception based on the use of controls. This is required in any type of technique so long as it is inferential.

Mr. MOORHEAD. What period of training would a person have to have to be able to carry out such an examination?

Mr. FULLER. That is a very difficult question to answer. You would not require the training, for example, for our instrument that the polygraph examiners require for interpretation of their physiological charts. There is a knowledge required on the part of the examiner of the psychology of stress in the structured interview and also the necessary knowledge of how to frame questions in the context of determination of deception. Furthermore, I think, say on-the-job training, or the equivalent of that, is necessary.

Now we on our part have not had to face up to this problem since all our sales to date have been to polygraphers.

Mr. MOORHEAD. To what?

Mr. FULLER. Polygraphers, to polygraph specialists. So we have not had to address ourselves to that particular problem at the moment.

Mr. MOORHEAD. So a trained polygrapher can use your equipment without further training, is that right?

Mr. FULLER. With very nominal training.

Mr. MOORHEAD. Nominal?

Mr. FULLER. Simply familiarization with this particular equipment. The logic is quite simple. In other words, as Mr. Backster has described the use of control and relevance. We have found that there is a rather simple logic that we can use. If we get a value on relevant questions that are at least 20 percent greater than that obtained on the associated control, this has to date shown itself to match up very well with the polygraph assessment of deception. Where we have done blind analyses, we find we normally have a very similar type of match up, using that type of analysis.

Mr. MOORHEAD. What was the intended use of your equipment research by the Limited War Laboratory?

Mr. FULLER. Sir, I believe they were responding to I think what they call QMR. The Army or the Department of Defense used to put out documentations as to desired research, desired objectives that gave a justification for the research, which was to develop a technique which was, in effect, a cordless lie detector.

Mr. MOORHEAD. What was the subsequent contract with the Land Warfare Laboratory?

Mr. FULLER. Well, that was the same agency but they just changed their name after a period of time.

Mr. MOORHEAD. What was the difference of the research, which was Army-sponsored also, and performed by Dr. Kubis, the difference between that and your research?

Mr. FULLER. Our work preceded that of Dr. Kubis. I had contact, I think it was in 1969, with Dr. Krauss in the Biological Sciences Section of at that time the Limited Warfare Lab, and I showed him the work that we had originally done in the use of voice. The results looked rather good, and he gave a small purchase order to follow on with that.

The results of that purchase order showed good enough. We obtained our final contract and we found we ran into distinct problems in obtaining enough polygraph tapes. We had great difficulty getting them as part of this project. So therefore LWL decided what they wanted to do was to go to Dr. Kubis to see if they couldn't resolve this problem and get a clear answer.

So the same project personnel then contracted with Dr. Kubis to set up some simulated crimes in which they knew who was innocent and who would be guilty, Mr. Chairman, and then to administer to these people polygraph examinations and to tape record the polygraph examinations and process the tape recordings through a voice stress analyzer, the PSE, and to do cross comparisons with polygraph evaluators and the known true roles of the subjects to try to get some final determination.

By the time we had concluded the third year of our work, I had become unhappy with the voice stress analyzer for the reasons I discussed in my opening statement.

Therefore, I developed another device, the Mark II voice analyzer which operates on entirely different principles. About January or so of 1973, I requested the project officer at LWL to supply us with a reasonable number of Dr. Kubis' tapes to see what we could do and what it would look like on this new instrument.

We got a $1,000 purchase order and we received, I think, all total of about 60 tapes, tapes of 60 individuals that had been part of Dr. Kubis' study, and we processed these. The contract called for us to supply the processed data to LWL on IBM punchcards. He had given to us tapes that said this was subject 12–A and 12–B and so forth. So we gave back to them on the IBM punchcards the results for subject 12–A and 12–B and so on.

And as far as I understand, they were then to pass this on to Dr. Kubis exactly as I think Dr. Gordon Barland processed the Dektor PSE material and then supplied the results back to Dr. Kubis.

I understood this was to happen, but it never did, and I don't know why, but it didn't. A month or two after we supplied this raw data to the LWL, they then supplied us with identification of about 45 of the tape recorded people, that is, whether they were the thief or accomplice or innocent. We did our studies to determine what kind of accuracy we got with this new device.

Dr. Kubis used what was a triad. In each triad of suspects one was the thief, one was an accomplice, and one was innocent. So if you could judge who was the thief, you therefore only had two people left, and they had to be either the accomplice or the innocent person.

And over half of our cases we didn't have the full triad. We had perhaps two of the three or one of the three parties in the triad.

Now of the cases where we had all three, we ran 93 percent accuracy. We had 15 people that were of that category. And of those 15, 14 of the 15 we correctly identified as guilty or innocent.

When we took all of the complete and incomplete triad cases together, we had 80 percent accuracy relative to guilt or innocence, as contrasted to Dr. Kubis' results on his polygraph of 86 percent.

The question concerning that difference between 80 or 86 percent is: Is that chance or is that real? And in running a statistical test, it turns out that it was just a chance difference.

Now, there was no way we could have contaminated our data. We used numbers and our logic was very straightforward.

Taking exactly the same data, the same tapes, you would come out with exactly the same findings. And our findings do show there was no significant difference between our accuracy—and in fact we came out with, I think, 93 percent accuracy for our full triad cases as contrasted to the polygraph accuracy of 86, and it shows us to be slightly better.

I am not sure if I haven't taken a very long route of answering your question, sir, but that is the answer.

Mr. MOORHEAD. I notice that you say on page 5 that you don't believe that the Mark II or any other instrument currently available can analyze routine dialog and determine deception based upon our present knowledge.

For example, would it be any help in an investigation to weed out a number of people, if you are investigating a number of people who could have committed the crime, by this method?

Mr. FULLER. That is a very difficult question. In dialog you find several things. A person thinks of blocks or various blocks of thought. And normally what will happen is the person will conceptualize what he is going to say and then he will speak. Often while he is conceptualizing, he will use the term "uh" and fill-ins like that. What we find at the beginning of any type of statement—and I am giving you an idealized case—is that the bulk of the stress, or rather I should use the word "tension" occurs at that period and then there tends to be a dropoff.

However, if you use the term "I" as a person as opposed to "eye" as a visual organ in the middle of the statement, you will get a significant change of tension at that point.

In other words, you find patterns. First of all you find patterns of stress that relate to blocks of thoughts building up at the beginning of the block and then tapering off.

It is very difficult to differentiate tension as associated with the difficulty of conceptualizing what you want to say and that tension associated with emotional stress. They both look the same, as far as I understand it, on the polygraph, and they look the same on our own instrument and any other instrument that I know of.

Therefore you can be measuring tension, but that does not necessarily have to be emotional stress. It may be the difficulty of conceiving what you are going to say.

Second, a very complex pattern of tension can occur in dialog. Someone gave us the tape recording of Patty Hearst's statement. You can read virtually anything you want into it.

We have a device that gives us an instantaneous readout of tension level on a word-by-word basis. It gives a value of the stress associated with each spoken word. But what do they mean? It is extremely complicated. It is very difficult to interpret.

So therefore at the present time I don't think we know enough. We just don't know enough to be able to truthfully say what the patterns of tension in dialog mean. And I am afraid anyone can find support for whatever interpretation he wishes to make from these patterns. This is very bad obviously.

Mr. MOORHEAD. Have any other agencies, besides the Department of the Army, funded your research?

Mr. FULLER. No, sir.

Mr. MOORHEAD. Thank you.

Mr. Cornish?

Mr. CORNISH. Thank you, Mr. Chairman.

Well, I guess you could say that the recordings of Patty Hearst would show that she had a problem anyway. The stress segments would be there, but nobody would know what they meant?

Mr. FULLER. No, that is right. You see the difficulty.

Mr. CORNISH. You mentioned the use of IBM punchcards?

Mr. FULLER. Yes.

Mr. CORNISH. And I think you were here earlier in the hearing when the subject was brought up about the possible use of computers in relation to lie detector devices, and I gather that in your case—at least in this instance—the results were put on IBM punchcards, and obviously went into some type of computer?

Mr. FULLER. Yes, sir; they generated computer printouts of it.

Mr. CORNISH. So this sort of thing does lend itself to some computer treatment after all, doesn't it?

Mr. FULLER. Oh, absolutely. You can have a direct tie if you want it, but the point is, why would you ever want it?

The raw data, it would be very hard to see what meaning it would have, sir.

Mr. CORNISH. Well, the point is that we are dealing with real life situations and the danger is where the results were put on punchcards, they would be instantly retrievable from a computer at some point if they were called out?

Mr. FULLER. Yes, sir.

Mr. CORNISH. And it could be done on an individual basis?

Mr. FULLER. On what, sir?

Mr. CORNISH. It could be done on an individual basis as well as long as you had an identifier?

Mr. FULLER. You can also do that in the polygraph if you wish.

Mr. CORNISH. Oh, sure. Well, I just wanted to get into the record the fact that there is a possible computer applicability to all of these testings.

Now, where you talk about the 93-percent match——

Mr. FULLER. That comes up several places, actually. It just turns out gratuitously, but there are two sets of statistics both of which come up with 93 percent.

Mr. CORNISH. Yes; now were these readings all done by the same people?

Mr. FULLER. No, sir.

Mr. CORNISH. They were not?

Mr. FULLER. No, sir. There were at least three different polygraph organizations which provided us polygraph tape recordings, and we would process those tapes. These tapes would only contain the test section itself. And after we processed the tapes and recorded our numerical values, we would indicate where deception occurred and our assessments as to whether the person was showing overall deception or no deception, or what.

We would then get together in the offices of the polygraph organization and give them back their tape recording and I would give them the original to our work and make a copy for ourselves. They would do an independent assessment of their polygraph charts and we would cross-compare our results.

Mr. CORNISH. Now, your device—oh, incidentally, is this in the process of manufacture?

Mr. FULLER. Yes, sir.

Mr. CORNISH. It is?

Mr. FULLER. Yes, sir.

Mr. CORNISH. And do you have a plant in Bethesda, Md.?

Mr. FULLER. No, sir. We are not a manufacturing organization, but we have two firms manufacturing them for me.

Mr. CORNISH. Where are they located?

Mr. FULLER. One is in Washington and the other is in New Jersey.

Mr. CORNISH. Well, you are really in competition, if I may use that term, with Dektor, aren't you?

Mr. FULLER. Yes, sir.

Mr. CORNISH. And allegedly your device would be an improvement on theirs because it is digital for one thing?

Mr. FULLER. It is real time.

Mr. CORNISH. Am I getting the correct understanding of your contention?

Mr. FULLER. Sir, you are correct.

Mr. CORNISH. Yes, and I understand also that you had a market survey made at one point?

Mr. FULLER. Not anything more than the typical type of thing that is done. We never paid anyone to do any survey. We did our own internal studies of what the potential markets might be.

Mr. CORNISH. Perhaps I am confused, but didn't you hire a firm in Rockville, Md., to do a market survey?

Mr. FULLER. No, sir. I think I know what you are talking about, but that was not done for us.

Mr. CORNISH. That was, I gather, for another purpose?

Mr. FULLER. Yes, sir, that is correct.

Mr. CORNISH. Have you sold any of these devices at all?

Mr. FULLER. Yes, sir.

Mr. CORNISH. And have you sold any to Government agencies?

Mr. FULLER. Yes, sir.

Mr. CORNISH. How many have you sold to Government agencies?

Mr. FULLER. Two.

Mr. CORNISH. Two? Was that to the Department of Defense or what agency?

Mr. FULLER. No, not the Department of Defense. I was told they were for test and evaluation.

Mr. CORNISH. Yes, but who tested and evaluated?
Mr. FULLER. Who, sir?
Mr. CORNISH. Who tested and evaluated?
Mr. FULLER. The CIA and National Security Agency.
Mr. CORNISH. Did they finish testing them?
Mr. FULLER. Oh, I don't know. They don't tell me, sir.
Mr. CORNISH. Did you ever hear from them again? They didn't put in an order for any more, did they?
Mr. FULLER. No, the one was just very recently delivered.
Mr. CORNISH. Are these being marketed to law enforcement agencies throughout the United States?
Mr. FULLER. No; we have——
Mr. CORNISH. And to employers? In other words, who would buy them?
Mr. FULLER. They are being marketed to heads of security departments who have polygraph training and also to polygraph firms.
Mr. CORNISH. I see. Do you have any foreign buyers for these devices?
Mr. FULLER. Is there a market there, sir? Is that what you said? No.
Mr. CORNISH. Thank you, Mr. Chairman.
Mr. MOORHEAD. Any questions?
Mr. DANIELS. No, sir.
Mr. PHILLIPS. No questions, Mr. Chairman.
Mr. MOORHEAD. Mr. Stettner?
Mr. STETTNER. I only have one question. I keep being confused by the results of tests represented to us by the different practitioners and the differences in their views from Dr. Kubis' report which says neither of the presently existing voice analyzers may be accepted as a lie detector within the constraints of an experimental paradigm. Then there are other details in Dr. Kubis' report showing correlation percentages substantially below those I heard today from proponents of voice analyzers.
Is there some simple explanation of this?
Mr. FULLER. For whatever their own good reason was, the Limited Warfare Laboratory did not transmit on our data to Dr. Kubis. Therefore, our instrument was not included in the evaluation and the report made by Dr. Kubis.
Mr. STETTNER. He speaks of "voice analyzers," and does he mean he is dealing only with Dektor's PSE?
Mr. FULLER. No, sir. Also, a device called the voice stress analyzer: two instruments.
Mr. STETTNER. Is the voice stress analyzer your product?
Mr. FULLER. Sir, I developed two different instruments. One was the voice stress analyzer and another one is the Mark II voice analyzer. They are two entirely different instruments.
Mr. CORNISH. The first one you were dissatisfied with, and so you came up with the Mark II?
Mr. FULLER. That is right. It isn't just a different instrumentation. It measures an entirely different parameter, in the speech.
I am thoroughly familiar with the report and I have spoken to Dr. Kubis a number of times about it. The point is with the Mark II we achieved a level of accuracy equal to or better than the polygraph. The

raw data is in the hands of the Army. Dr. Kubis also has the printout of the raw data. So if anyone wants to, it is the type of thing easily checked and verified. I hope it would be.

Mr. CORNISH. I have just one further question. You are dealing with the element of stress too. Is that correct?

Mr. FULLER. That is correct.

Mr. CORNISH. And so you are not claiming that your device differentiates between the truth and falsity, are you?

Mr. FULLER. Only through inference.

Mr. CORNISH. All right. And inferences are just exactly what inferences are, they may infer something and they may not infer something?

Mr. FULLER. That is true, but given the same conditions as Dr. Kubis, we obtained 93 percent accuracy in identifying guilt and innocent parties using inference.

Mr. STETTNER. That is all, Mr. Chairman.

Mr. MOORHEAD. Any more questions?

Well thank you very much, Mr. Fuller. We are learning a lot about these devices and you have been a great help to us.

[Questions submitted in writing to Mr. Fuller and the replies follow:]

QUESTIONS FOR FRED. H. FULLER

Question 1. Have the CIA and NSA each purchased one of your Mark II Voice Analyzers, or do they have your earlier instrument designated as the Voice Stress Analyzer?

Reply. NSA purchased a preproduction or prototype version of the Mark II Voice Analyzer. The CIA purchased a production version of the Mark II. Neither organization purchased a Voice Stress Analyzer from me or Technical Development, Inc.

Question 2. Do you have unfilled orders from other Federal agencies and if so, for what quantities and from which agencies?

Reply. No.

Question 3. Can you identify any research (past or present) which relates to differentiating that tension associated with the difficulty of conceptualizing a response and the emotional stress associated with any attempts at deception?

Reply. I am not familiar with any research which has directly addressed this problem area. The paper we prepared on task induced stress indirectly explores this condition since the "bursts" of stress occurring at the beginning of each repetitious phrase must be associated with conceptualization and not with the momentary task characteristic.

Question 4. Absent such differentiation, how can examiners using either the polygraph, psychological stress evaluator, or the voice analyzer represent that the stress indications shown by their equipment can be correlated directly with "lying", "deception", or "guilt"?

Reply. Assessment of deception is an inferential process. Significant and consistent increases in emotional stress are considered to be correlates of not responding truthfully. Control questions are used to provide a baseline of either the average tension existing in the test situation or the stress occurring when a person is deceptive about a relatively innocuous subject. Relevant or crime-related questions are asked immediately after control questions and a significant increase in stress must be produced to these questions for the reaction to be considered deceptive. The same questions asked in the first test are repeated in a second and third test and the subject must show a consistent pattern of stress reactions to a relevant question for him to assessed as lying to that question. The examiner reviews each question with the subject prior to his formal testing. This should reduce to a minimum the conceptualization stress effects discussed in the preceding question.

The techniques described herein are appropriate to all techniques which measure emotional stress.

Question 5. Is there any relationship between your firm and an organization identified as Decision Control, Inc.?

Reply. No. From 1970 through 1972 I was Vice President and a Director of Decision Control, Inc. I brought to that company the concepts and designs embodied in the Voice Stress Analyzer. In March 1972 I resigned all my positions with that company.

Mr. MOORHEAD. The subcommittee will adjourn until 10 tomorrow morning. We will meet in this room to hear testimony from Government agencies.

[Whereupon, at 4:15 p.m., the subcommittee adjourned, to reconvene at 10 a.m., Wednesday, June 5, 1974.]

THE USE OF POLYGRAPHS AND SIMILAR DEVICES BY FEDERAL AGENCIES

WEDNESDAY, JUNE 5, 1974

HOUSE OF REPRESENTATIVES,
FOREIGN OPERATIONS AND
GOVERNMENT INFORMATION SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10:10 a.m., in room 2203, Rayburn House Office Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representatives William S. Moorhead and John N. Erlenborn.

Also present: William G. Phillips, staff director; Norman G. Cornish, deputy staff director; and Stephen M. Daniels, minority professional staff, Committee on Government Operations.

Mr. MOORHEAD. The Subcommittee on Foreign Operations and Government Information will please come to order.

This morning we conclude the segment of our hearings dealing with the use by Federal agencies of so-called "lie detection" and similar types of equipment.

Yesterday, we heard from witnesses who expressed concern over the constitutional and civil libertarian aspects of the issue, from a spokesman from the largest union of Federal governmental employees, and from several witnesses representing companies or associations of operators of various types of "lie detection" equipment—polygraphs, the psychological stress evaluator, and the voice stress analyzer.

Today we will receive testimony on this subject from the Civil Service Commission, the Justice Department and the FBI, the State Department, and this afternoon from the Department of Defense and the Central Intelligence Agency.

As I indicated yesterday, these hearings are an updating of similar hearings on "lie detectors" and telephone monitoring practices of Federal agencies that were conducted by this subcommittee during the 1960's. Two days of hearings will be held next week—Tuesday, June 11, and Thursday, June 13—on Federal agency telephone monitoring. I am pleased to announce today that these 2 days of hearings will be broadcast nationwide by the National Public Radio network, such action being concurred in by the ranking minority member (Mr. Erlenborn). This open hearing policy has a long tradition in this subcommittee, and we appreciate the action of National Public Radio in selecting these hearings for broadcast. In these days of slipping credibility in Government and institutions, we have a unique opportunity to demonstrate to the public how an investigative subcommittee of

Congress can operate effectively in an area of major interest and concern to many Americans.

I will call the names of the witnesses in the order that they will be called. We will start with Mr. Anthony Mondello, General Counsel, the Civil Service Commission.

Will you come forward, Mr. Mondello.

We will then hear from Mr. Henry S. Dogin, Deputy Assistant Attorney General, Criminal Division, Department of Justice.

You might as well come forward now, Mr. Dogin.

And then from Mr. Bell P. Herndon, Supervisory Special Agent, Federal Bureau of Investigation, Department of Justice.

Mr. Herndon, why don't you come forward and take a seat.

It is my intention to have each of you present your statements and then we will have questions. I don't know if we can get all the witnesses at the table at one time. We have three more.

Mr. Marvin Gentile, Deputy Assistant Secretary for Security, Department of State. Would you come forward, sir.

And Mr. D. O. Cooke, Deputy Assistant Secretary, Office of the Comptroller, Department of Defense.

Mr. Mondello, would you start us off?

STATEMENT OF ANTHONY L. MONDELLO, GENERAL COUNSEL, CIVIL SERVICE COMMISSION

Mr. MONDELLO. Mr. Chairman, I appreciate this opportunity to present the views of the Civil Service Commission on the use of the polygraph in the Federal service and to enumerate steps the Commission has taken to restrict the use of the polygraph in the competitive service over which we have jurisdiction.

The Commission itself does not possess any psychological stress evaluation devices such as and including the polygraph. We make no use of the polygraph or other so-called lie detector devices in our internal operations or in our Government-wide investigative activities.

House Report No. 198, 10th report by the Committee on Government Operations, entitled "Use of Polygraphs as 'Lie Detectors' by the Federal Government," issued in 1965, included the recommendation that the President establish an interagency committee to study problems posed by the Federal Government's use of polygraphs and to work out solutions to those problems. An interagency study of the use of the polygraph in the executive branch was made under the direction of John W. Macy, Jr., then Chairman of the Civil Service Commission. As a result of this study, the Commission promulgated instructions governing the use of the polygraph for employment screening and personnel investigations of applicants for and appointees to competitive service positions. I stress that it covers both applicants and those appointed.

These instructions were issued October 25, 1968, by Federal Personnel Manual system letter to agencies and departments and subsequently incorporated into the Federal Personnel Manual, chapter 736, appendix D. A copy of these instructions is attached.

I have attached a copy of those instructions to my statement.

Mr. MOORHEAD. Without objection they will be made a part of the record.

[The instructions referred to follow:]

USE OF THE POLYGRAPH IN PERSONNEL INVESTIGATIONS OF COMPETITIVE SERVICE APPLICANTS AND APPOINTEES TO COMPETITIVE SERVICE POSITIONS

D–1. AGENCIES WHICH MAY USE THE POLYGRAPH

(*a*) An executive agency which has a highly sensitive intelligence or counterintelligence mission directly affecting the national security (e.g., a mission approaching the sensitivity of that of the Central Intelligence Agency) may use the polygraph for employment screening and personnel investigations of applicants for and appointees to competitive service positions only after complying with the requirements in D–2 and D–3 below.

(*b*) All other uses of a polygraph to screen applicants for and appointees to competitive positions are forbidden regardless of whether the polygraph examination is administered by the agency concerned or was obtained by that agency from another source such as an examination given previously by another Federal agency or by a non-Federal agency.

D–2. DETERMINING WHETHER AGENCY MISSION MEETS CRITERIA

The executive agency must submit to the Chairman of the Civil Service Commission (*a*) a statement of the nature of its mission and (*b*) a copy of its current regulations and directives governing use of the polygraph as provided in D–3 below (or a citation to them if there has been no change since they were previously submitted and approved). The Chairman shall then determine whether the agency has an intelligence or counterintelligence mission directly affecting the national security and whether the regulations and directives meet current approval requirements.

D–3. REVIEW OF AGENCY REGULATIONS AND DIRECTIVES

(*a*) The agency shall prepare regulations and directives governing use of the polygraph in employment screening and personnel investigations which must be reviewed and approved by the Chairman of the Civil Service Commission. These shall contain at a minimum:

(1) Specific purposes for which the polygraph may be used, and details concerning the types of positions or organizational entities in which it will be used, and the officials authorized to approve these examinations.

(2) A directive that a person to be examined must be informed as far in advance as possible of the intent to use the polygraph and of—

(*a*) other devices or aids to the interrogation which may be used simultaneously with the polygraph, such as voice recordings;

(*b*) his privilege against self-incrimination and his right to consult with legal counsel or to secure other professional assistance prior to the examination;

(*c*) the effect of the polygraph examination, or his refusal to take this examination, on his eligibility for employment. He shall be informed that refusal to consent to a polygraph examination will not be made a part of his personnel file;

(*d*) the characteristics and nature of the polygraph machine and examination, including an explanation of the physical operation of the machine, the procedures to be followed during the examination, and the disposition of information developed; and

(*e*) The general areas of all questions to be asked during an examination.

(3) A directive that no polygraph examination will be given unless the person to be examined has voluntarily consented in writing to be examined after being informed of the above, (*a*) through (*e*).

(4) A directive that questions to be asked during a polygraph examination must have specific relevance to the subject of the particular inquiry.

(5) Adequate standards for the selection and training of examiners, keeping in mind the Government's objective of insuring protection for the subject of an examination and the accuracy of polygraph results.

(6) A provision for adequate monitoring of polygraph operations by a high-level official to prevent abuses or unwarranted invasions of privacy.

(7) A provision for adequate safeguarding of files, charts, and other relevant data developed through polygraph examinations to avoid unwarranted invasions of privacy.

D–4. RESTRICTION ON APPROVAL TO USE THE POLYGRAPH

Approval to use the polygraph will be granted only for 1-year periods and is conditioned upon prior approval of the agency's regulations and directives as provided in D–3 above. An agency given approval to use the polygraph for competitive service positions will be required to recertify annually that the conditions which led to the original certification still exist in the agency.

Mr. MONDELLO. The current regulations, which include minor refinements made in 1973, contain the following essential provisions:

An executive agency which has a highly sensitive intelligence or counterintelligence mission directly affecting the national security may use the polygraph for employment screening and personnel investigations of applicants for and appointees to competitive service positions only after receiving written approval from the Chairman of the Civil Service Commission.

The executive agency must submit to the Chairman of the Civil Service Commission a statement of the nature of its mission and a copy of its regulations and directives governing the use of the polygraph. The Chairman of the Civil Service Commission determines whether the agency has an intelligence or counterintelligence mission directly affecting the national security and whether the regulations and directives meet the approval requirements. As a minimum, these requirements include:

(1) Specific purposes for which the polygraph may be used, and details concerning the types of positions or organizational entities in which it will be used, and the officials authorized to approve these examinations.

(2) A directive that a person to be examined must be informed as far in advance as possible of the intent to use the polygraph and of, and a number of other things I shall now list:

(*a*) Other devices or aids to the interrogations which may be used simultaneously with the polygraph, such as voice recordings, video tapes, and so on.

(*b*) His privilege against self-incrimination and his right to consult with legal counsel or to secure other professional assistance prior to the examination.

(*c*) The effect of the polygraph examination, or his refusal to take this examination, on his eligibility for employment. He shall be informed that refusal to consent to a polygraph examination will not be made a part of his personnel file.

(*d*) The characteristics and nature of the polygraph machine and examination, including an explanation of the physical operation of the machine, the procedures to be followed during the examination, and the disposition of information developed

(*e*) The general areas of all questions to be asked during an examination.

(3) A directive—again, these are minimal requirements—that no polygraph examination will be given unless the person to be examined has voluntarily consented in writing to be examined after having been informed of the above, (a) through (e).

(4) A directive that questions to be asked during a polygraph examination must have specific relevance to the subject of the particular inquiry.

(5) Adequate standards for the selection and training of examiners,

keeping in mind the Government's objective of insuring protection for the subject of an examination and the accuracy of polygraph results.

(6) A provision for adequate monitoring of polygraph operations by a high-level official to prevent abuses or unwarranted invasions of privacy.

(7) A provision for adequate safeguarding of files, charts, and other relevant data developed through polygraph examinations to avoid unwarranted invasions of privacy.

My office—the Office of General Counsel of the Group—and the Bureau of Personnel Investigations conduct a review of the agency directives and regulations in conjunction with each request to use the polygraph.

As you will see in a moment, that is not a lot of work because we don't have many requests.

Final review and approval is reserved to the Chairman of the Civil Service Commission, which is the limit of our jurisdiction. Approval to use the polygraph is granted only for 1 year and an agency given approval to use the polygraph for competitive service positions is required to recertify annually that the conditions which led to the original certification still exist in the agency.

All other uses of a polygraph to screen applicants for and appointees to competitive service positions are forbidden. This prohibition applies to the use of the results of polygraph examinations given previously by that agency, another Federal agency or a private source.

The use of devices that have capabilities as lie detectors is restricted by the Federal Personnel Manual, chapter 736, appendix C, which states:

"In conducting full field (background) investigations for acceptability for employment in critical-sensitive competitive service positions under Executive Order 10450, Federal personnel investigators are not authorized to: . . . (7) Use the polygraph or other so-called lie detectors except as authorized in appendix D. (Federal Personnel Manual, chapter 736, appendix D previously presented)" which is the set of provisions I have already outlined to you.

Executive Order 10450, section 14, charges the Civil Service Commission with the responsibility for making a continuing study of the manner in which the order is being implemented by departments and agencies for the purpose of determining:

(1) Deficiencies in security programs established under the order which are inconsistent with the interests of, or directly or indirectly weaken, the national security and then the countervailing stress.

(2) Tendencies in these programs to deny to individual employees fair, impartial, and equitable treatment at the hands of the Government, or rights under the Constitution and laws of the United States or Executive Order 10450.

The Commission's Bureau of Personnel Investigations includes the Office of Security Appraisal, which conducts these studies. Each study made at a department or agency includes examination of pertinent files and regulations, and looks into whether the agency uses the polygraph, how it is used, extent of use, and whether it is used only for approved purposes.

An agency is required to take necessary steps to correct any material weakness or deficiency disclosed during the appraisal and to notify

the Commission of the changes made. This requirement would be applied to any unapproved use of the polygraph, or any similar device.

I should point out that the survey is far more broadly based than merely to inquire into polygraph use. It is an overall survey designed to see whether these two twin standards, whether the security programs are effective, whether investigative reports are being used properly, and whether people's rights are being observed. Those are all in the bag.

Our experience since the issuance of our instructions in 1968 leads to the conclusion that little use has been made of the polygraph in relation to competitive civil service employment. Only one agency, the Department of Defense, has submitted a request for approval of the use of the polygraph. The initial DOD request dated June 20, 1969, was not approved.

By letter of July 8, 1969, Chairman Hampton advised the DOD that DOD Directive 5210.48, issued July 13, 1965, which governed the use of the polygraph throughout the Department, needed to be updated and clarified so that it more specifically met the criteria set forth in our instructions.

A second Department of Defense request, dated March 14, 1973, resulted in the Commission granting DOD authority to use polygraph examinations for certain limited categories of employees as set forth in the attached letter dated April 17, 1973.

Mr. MOORHEAD. Which, without objection, will be made a part of the record.

Mr. MONDELLO. Thank you, Mr. Chairman.

[The letter referred to follows:]

U.S. CIVIL SERVICE COMMISSION,
Washington, D.C., April 17, 1973.

Mr. D. O. COOKE,
Deputy Assistant Secretary of Defense, Office of the Assistant Secretary of Defense, Washington, D.C.

DEAR MR. COOKE: This is in response to your letter of March 14, 1973, requesting that the Secretary of Defense be granted authority to use polygraph examinations for certain categories of competitive service employees who will be assigned to work in intelligence or counterintelligence activities directly affecting the national security.

In accordance with the provisions of appendix D, chapter 736, Federal Personnel Manual, the Secretary of Defense is hereby granted authority to use polygraph examinations for competitive service employees in the following categories:

Approximately 10 Defense Intelligence Agency competitive career employees who will work in a joint Central Intelligence Agency-Defense Intelligence Agency intelligence production.

Those competitive career employees of the Defense agencies who are to be assigned for training in the Departmentwide Intelligence Training and Career Development Program with the Defense Intelligence Agency and the National Security Agency.

Those competitive career employees assigned to ad hoc study groups and task forces involving highly sensitive intelligence projects where they will work with excepted service employees who are subject to polygraph examinations.

Those competitive career employees assigned or detailed to the Central Intelligence Agency in activities where polygraph examination is required by the Central Intelligence Agency.

This authority is extended to the Secretary of Defense with the restriction that he or his designee will consider the circumstances of each individual case with due regard for the rights of the specific employee and that he or his designee will permit the polygraph examination for employment screening and personnel investigations of competitive service employees only after he has verified that the agency conducting the examination will follow the procedures for administer-

ing the polygraph as set forth in appendix D–3, chapter 736 of the Federal Personnel Manual.

This approval is granted for a period of 1 year from the date of this letter, and will terminate automatically unless, prior to that time, a request for further approval is made in writing recertifying the intelligence or counter-intelligence mission directly affecting the national security, and that those competitive career employees subject to polygraph examination will be involved in such intelligence or counter-intelligence activities.

Sincerely yours,

ROBERT E. HAMPTON,
Chairman.

Mr. MONDELLO. A request for renewal of this approval was received this year, and the request is presently under consideration in my office. Until we are through dealing with the Department of Defense on the regulation, I will not put the matter before the Chairman of the Commission, but when I am in shape to do so, I will.

Our security appraisals have disclosed no misuse of the polygraph. Our recent appraisal at the National Aeronautics and Space Administration did disclose that that agency did have regulations setting forth policy regarding polygraph examinations which did not conform to our instructions. Our appraisal of this agency was closed out on May 17, 1974, at which time NASA officials agreed to revoke this policy. We were also assured that this policy had not been used in violation of our instructions.

In summary, the Civil Service Commission neither possesses nor makes use of the polygraph or other psychological stress evaluation devices. We have issued stringent instructions governing the use of such devices in our area of authority, the Federal competitive service. I will be happy to answer any questions and to provide any additional information requested by this subcommittee.

Mr. MOORHEAD. Thank you very much, Mr. Mondello, for an excellent statement.

The subcommittee would now like to hear from Mr. Dogin, Deputy Assistant Attorney General.

Mr. Dogin.

STATEMENT OF HENRY S. DOGIN, DEPUTY ASSISTANT ATTORNEY GENERAL, CRIMINAL DIVISION, DEPARTMENT OF JUSTICE

Mr. DOGIN. Thank you, Mr. Chairman.

My name is Henry S. Dogin. I am Deputy Assistant Attorney General of the Criminal Division of the Department of Justice. With me is Michael Abbell, a staff assistant to Henry E. Petersen, Assistant Attorney General of the Criminal Division. I appreciate the opportunity to appear before this subcommittee on behalf of the Department to present the Department's views on lie detection.

Unlike most of the other agencies whose representatives have appeared and will appear before this subcommittee in conjunction with these hearings, the Criminal Division is not a direct user of the polygraph or other similar devices. We do not have any qualified polygraph examiners on our staff, nor do we own any polygraph instruments.

The relatively few polygraph examinations that are given in connection with matters under the prosecutive supervision of the Criminal Division are given by the various Federal investigative agencies in conjunction with their investigations of alleged criminal violations.

Generally, such polygraph examinations are given at the initiative of the investigative agency handling the investigation without consultation with the Criminal Division or a U.S. attorney's office, but with the approval of high-level officials of those agencies.

Occasionally, especially in sensitive cases, the Criminal Division or a U.S. attorney's office will request the appropriate investigative agency to conduct a polygraph examination of a key witness or a potential defendant provided such persons, of course, consent to the polygraph examination.

We are unaware of any use of devices allegedly having similar functions as the polygraph, such as the psychological stress evaluator, by any Federal investigative agency with respect to any matter under the prosecutive supervision of the Criminal Division.

The Criminal Division believes that the polygraph has proved to be a useful adjunct to the normal interview and interrogation process in certain limited circumstances in a very small percentage of matters under its prosecutive supervision. In this regard, the polygraph has been particularly useful in screening members of a "closed" group of persons with access to property that was stolen or embezzled (primarily in connection with bank embezzlements, thefts of secured Government property, and thefts from postal registries). It has also been useful as an informant screening device to prevent unnecessary investigative efforts, to test the credibility of informants, and to protect agents against unnecessary risks. It should be noted, however, that no civilian Federal investigative agency has ever used the polygraph in more than a small fraction of 1 percent of the matters falling under its investigative jurisdiction.

While the Criminal Division approves of the use of polygraph examinations by Federal investigative agencies in such limited circumstances as an adjunct of the investigative process, we view the results of such examinations with caution and oppose their introduction into evidence at trial. To this end, U.S. attorneys are instructed not to seek the admission in evidence of polygraph examinations and to oppose all attempts by defense counsel to seek the admission of such examinations.

Thus far the eight U.S. courts of appeals which have considered the question of the admissibility of polygraph results, as well as the vast majority of State courts, have concurred in our position.

There are a number of reasons for this policy of viewing polygraph results with caution and of arguing for their exclusion from evidence at trial.

First, while proponents of the polygraph claim 80 to 90 percent or even higher accuracy for the technique, their statistics are open to challenge because of the great difficulty in obtaining independent corroboration of the results of the vast majority of examinations—especially those examinations indicating the subject was not trying to deceive the examiner.

Second, the results of polygraph examinations cannot be viewed with the same equanimity as the results of forensic tests such as fingerprints, ballistics, and blood tests because—

(1) there is no specific physiological reaction indicative of deception, and even the same person may have inconsistent physiological reactions associated with deceptive responses;

(2) apparent indications of deception may be caused by other psychological factors;

(3) the moral attitude toward lying by the subject may affect his reactivity;

(4) the subject may be able to manufacture physiological responses, such as intensifying his reactions to control questions, thereby effectively masking his reactions to relevant questions;

(5) mental instability or aberration may affect the reactivity of a subject;

(6) the taking of depressant drugs may affect a subject's reactivity;

(7) the physical circumstances incident to an examination may affect a subject's physiological reactions;

(8) the complexity and nature of the matters being inquired into may affect a subject's reactions (for example, a subject may be able to rationalize his answers in matters involving his state of mind, such as questions relating to intent or knowledge, but would be less likely to be able to rationalize his answers to simple direct questions such as, did you shoot a particular individual?); and

(9) other objective factors such as a subject's involvement in other similar acts, excessive interrogation prior to the polygraph examination, and excessive test length may also affect the accuracy of polygraph results.

In addition to these objective factors affecting the validity and reliability of polygraph results, subjective factors, such as the polygraph examiner's observation of the subject's behavior during the test procedure, the effect of the interaction of the polygraph examiner and the subject, and the subjective bias of the polygraph examiner, may all affect the validity and reliability of any examination.

Third, and possibly most important, because of the undue reliance juries are likely to place on the apparent mechanistic accuracy of polygraph results, we believe that the introduction in evidence of polygraph results would virtually vitiate juries' historical factfinding responsibilities. As Judge Irving Kaufman eloquently stated 15 years ago:

> The most important function served by a jury is in bringing its accumulated experience to bear upon witnesses testifying before it, in order to distinguish truth from falsity. Such a process is of enormous complexity, and involves an almost infinite number of variable factors. It is the basic premise of the jury system that 12 men and women can harmonize those variables and decide, with the aid of examination and cross-examination, the truthfulness of a witness. . . . I am not prepared to rule that the jury system is outmoded. I still prefer the collective judgment of twelve men and women who have sat through . . . a trial and heard all the evidence on the guilt or innocence of a defendant.

Indeed, unless there is a constitutional amendment which substitutes trial by polygraph for trial by jury, the Criminal Division will oppose the introduction in evidence of polygraph results.

Fourth, under the common law rules of evidence and proposed rule 704 of the Rules of Evidence for United States Courts and Magistrates, polygraph results, which one court of appeals has perceptively referred to as little more than "electrical oath-helpers," would not be the proper subject of expert testimony.

Fifth, the admission of polygraph results would greatly attenuate

the length of trials and lead to a potentially serious confusion of the issues. Our experience with hearings on defense attempts to introduce polygraph results in evidence is that these hearings take more of the courts' time than 75 percent of all criminal trials. It readily can be seen that such hearings not only would more than double the length of most trials, but also would lead to serious confusion of the issues involved in a case because at least as much of the court's time would be spent "trying" the polygraph examination as the issues involved in the case. Moreover, if courts admit polygraph results of defendants, should they not also admit polygraph results for key witnesses or even all witnesses?

Additionally, if the use of the polygraph becomes prevalent, jurors may come to believe that any defendant who does not submit polygraph results indicating his innocence is presumably guilty.

Sixth, it is our belief that there is no proper evidentiary purpose served by polygraph results which would justify their admissibility in evidence under either common law rules of evidence or the proposed Federal Rules of Evidence. Polygraph results are not properly classifiable as substantive evidence, evidence of character trait or credibility, or rehabilitation evidence as an exception to the prior consistent statement rule.

Finally, if the Government were to seek the introduction of polygraph results of defendants in cases in which defendants failed to testify, serious fifth amendment problems would arise. If defendants were to successfully introduce polygraph results in cases in which they did not intend to testify, serious questions would arise as to whether they did not thereby waive their fifth amendment rights and could be required to take the stand.

Because of our policy not to seek the admission in evidence of polygraph results, questions as to the admissibility of Government-given polygraph examinations are seldom likely to arise. However, with apparent increasing frequency, we are facing attempts by defense counsel to introduce the results of defense-given polygraph examinations.

In addition to all of the reasons I have set forth as to why the results of Government-given polygraph examinations should be excluded from evidence, there are substantial strong reasons for our continuing effort to prevent the admission in evidence of defense-given polygraph examinations.

First, a polygraph subject's concern at being detected in a lie appears to be the most important factor giving rise to the physiological indications of deception in a polygraph examination. A defense-given polygraph examination, in which a defendant can expect that any adverse results will not go past his lawyer, hardly is conducive to creating the requisite degree of concern necessary to produce physiological indications of deception.

Thus, it can be expected that defense-given polygraph examinations will be far less accurate than Government-given tests.

Second, despite this theoretical expectation of decreased validity and reliability of defense-given examinations, no study has ever been undertaken to attempt to assess the accuracy of polygraph examinations given in these circumstances. Thus, there is no basis for assessing the probative weight which should be accorded such tests.

Third, the atmosphere surrounding a test given by a "friendly" polygrapher may well make a defendant-subject confident he can beat the test, thereby increasing the probability he will not be detected.

Fourth, a defense polygrapher will often have insufficient information upon which to base the relevant questions. If the right questions cannot be asked, the lack of deceptive responses is meaningless.

Fifth, the lack of adequate professional and statutory standards governing polygraph examiners makes the situation ripe for less than competent professional conduct if not outright fraud by defense retained polygraph examiners.

Sixth, there are no controls which would prevent polygraph examiner "shopping," thereby permitting repeated examinations by different examiners until a defendant "passes" a test.

Finally, absent the videotaping of the whole examination procedure, the Government will be severely inhibited in cross-examining defense polygraphers about the multitude of factors which may have influenced the examinations and affected their conclusions. We are unaware of any instance in which a defense-given polygraph was even partially videotaped.

In addition to Government and defense polygraph examinations, at least one district court has proposed examinations by court appointed experts where a defendant seeks to introduce the results of his own test. While subject at a minimum to the admissibility problems attendant to Government-given polygraph examinations, examination by court appointed experts will not prevent the parties from calling their own experts.

Moreover, there is some evidence that once a defendant-subject has proven to himself that he can beat the polygraph technique by passing a defense given test, it is likely to have a carryover effect on his ability to remain unresponsive on a test administered by a court appointed or Government expert.

This concludes my prepared remarks on the Criminal Division's position with respect to the use of the polygraph as an adjunct to the investigative process and with respect to the admissibility of polygraph results in evidence.

I would be happy to answer any questions you may have at this time.

Mr. MOORHEAD. Thank you, Mr. Dogin. That was an excellent legal brief you have presented to the subcommittee.

The subcommittee would now like to hear from Mr. Bell P. Herndon, Supervisory Special Agent, Federal Bureau of Investigation.

Mr. Herndon.

STATEMENT OF BELL P. HERNDON, SUPERVISORY SPECIAL AGENT, FEDERAL BUREAU OF INVESTIGATION, DEPARTMENT OF JUSTICE

Mr. HERNDON. Good morning, Mr. Chairman.

The years roll by. Nine years ago I had the pleasure to appear before the committee when the FBI gave detailed information concerning the polygraph. I will attempt to bring the committee up to date on our current activities.

The Federal Bureau of Investigation has previously furnished to

the Department of Justice for the General Accounting Office information in response to your questionnaire survey of October 1973. In accordance with your request the FBI will briefly expand and update the material we furnished at that time which supplemented our detailed testimony before this subcommittee on May 26, 1965.

At the present time, the FBI has 43 polygraph instruments at an acquisition cost of $45,646. We currently have 39 special agent polygraph examiners strategically located in 35 of our 59 field offices. The FBI uses the polygraph technique only in carefully selected cases involving criminal and security violations in which we have investigative jurisdiction. We do not use the polygraph for applicant or general personnel screening. We do not have or use the psychological stress evaluator or similar devices.

The difference in the number of instruments and agents trained as examiners from the October survey is caused by the fact that the FBI laboratory recently completed a Polygraph Examiners Training School in May 1974 at our academy in Quantico, Va.

We have trained 14 more special agents to provide adequate coverage of this investigative technique especially in view of the fact many of our experienced special agent examiners are at or near eligible retirement age. As a matter of interest the average age and experience of agents in this recent school was 40 years with 17.5 years' investigative experience. The FBI continues to select only mature and skilled special agents who already are recognized as outstanding interrogators for this highly specialized training. Other considerations in selecting agents for this training were:

Personal recommendation by special agent in charge; marked proficiency in planning and conducting interviews with particular reference to alertness and facility in thought; academic training in psychology; physiology; law; social sciences or previous training and experience with the polygraph; ability to gain confidence of others and handle people under difficult circumstances with such personal characteristics as maturity, stability of temperament, good judgment, and initiative; genuine interest in receiving training and developing skill in scientific interrogation techniques; and other considerations such as fluency in speaking a foreign language.

Thus far in fiscal year 1974—July 1, 1973 to May 31, 1974, or the past 11 months—FBI Headquarters authorized the polygraph technique in 181 investigative matters—I recently updated that by computer this morning, and it is now 191—out of a total of approximately 700,000 investigative matters handled by the FBI in this same period. During this period we actually conducted a total of 197 polygraph examinations—this has been updated to 203.

I might add, Mr. Chairman, that we presently have 102 examinations pending.

Based on FBI experience and judgment with the polygraph over the years, the technique does not lend itself to accurate pinpointing of percentage validity or reliability. Therefore, the FBI's official position has always been that we do not consider polygraph examinations sufficiently precise to permit absolute judgment of guilt or nonguilt—lie or truth—without qualifications. The polygraph is an instrument designed to record psychophysiological responses during a carefully

controlled interrogation which may indicate deception when properly evaluated by the examiner.

The FBI does not rely solely on the polygraph technique or use it as a substitute for logical investigation. The results are considered within the context of a full and complete investigation. However, with proper ethics by the polygraph examiner and tight administrative control by the user agency, there is no question but that the polygraph can be a valuable investigative aid to supplement interrogation in selected criminal and national security cases. Interrogation is a basic tool of any investigative agency and the FBI considers the polygraph technique a thorough and specialized interview procedure in which a skillful interrogator is attempting to simply ascertain the truthful facts from a consenting individual regarding a matter in which we have jurisdiction.

In some instances suspects will admit deception and furnish confessions and/or signed statements. In most instances valuable new information or investigative direction is developed as a result of the examination and followup interrogation.

In conclusion, the FBI firmly believes it fully meets or exceeds the previous recommendations of this subcommittee to Government agencies to prevent proliferation and misuse of the polygraph.

Mr. MOORHEAD. Thank you very much, Mr. Herndon, for an excellent statement.

The subcommittee would now like to hear from Mr. Marvin Gentile, Deputy Assistant Secretary for Security, Department of State.

STATEMENT OF G. MARVIN GENTILE, DEPUTY ASSISTANT SECRETARY FOR SECURITY, DEPARTMENT OF STATE

Mr. GENTILE. It is a pleasure, Mr. Chairman, to meet with this subcommittee and discuss the Department of State's program concerning the use of the polygraph.

First, I would like to update the statistical data the Department provided the General Accounting Office for the subcommittee's use last fall. In 1973 the Department of State arranged for one polygraph examination of an employee. That was the only such examination in 1973 and there have been none to date this year.

The Department's earlier responses regarding polygraph policy questions remain as submitted last fall but I will summarize our policy briefly here.

The Department of State recognizes that the true polygraph procedure, when employed by properly trained and experienced examiners, can be a useful collateral technique in the successful interrogation of persons suspected of intentional deception. We have had no experience with the so-called psychological stress evaluator, but we are aware that the professional polygraph associations generally regard the reliability of the latter as not yet adequately demonstrated.

The Department's Office of Security, in fulfilling its security responsibilities which include several thousand investigations each year, has found it useful in rare cases—some 18 in the last 10 years—to request employees to undergo polygraph examination to resolve disputed or seriously questionable testimony.

Generally speaking, these cases have involved questions of possible exploitation by hostile intelligence. Very rarely the technique has been

used at an employee's own request to support his denial of allegations in the face of unusually persuasive testimony.

In sum, the polygraph is used only in the more serious cases and only when all other investigative techniques have been inconclusive. Our operating instructions are such that I, as the Deputy Assistant Secretary for Security, must personally approve the use of the polygraph and I am in a position to limit its use to these more serious cases.

Because of the infrequency of our need for polygraph examination and the essential requirement that a qualified examiner maintain his skills on a continuing basis, the Department of State has never attempted to train or qualify any of its agents on the polygraph or to acquire the necessary equipment. Instead, we have in the past relied upon the professional assistance of other governmental agencies which do have the capability in this area.

It is well known, of course, that the nature of the polygraph technique is such that to be used successfully it requires a degree of cooperation and voluntariness on the part of the individual being examined. I would like to emphasize that, should we deem it appropriate to ask an employee to undergo a polygraph examination, we first carefully explain the technique to him, advise him that it is purely a voluntary procedure in the truest sense of that word and that no adverse inference will be drawn from his refusal should he decline, and, finally, we secure from him written acknowledgement of his understanding of these points.

I would like to comment briefly on the weight accorded to the results of polygraph examination, which is a matter often misunderstood by people not intimately familiar with our security evaluation practices. In most cases handled in the past 10 years, the results have supported the employee's previous testimony. In some cases the results may suggest further lines of investigation or interview leading eventually either to proof of guilt or demonstrable innocence. In either event, the results of the polygraph examination are supportive only. During the past 10 years the Office of Security has never evaluated a security case solely on the grounds of adverse results of a polygraph examination nor have we ever cited an employee's refusal to take a polygraph examination in any evaluation.

To close, I would like to state my personal opinion that the polygraph is a useful collateral technique if administered by well trained and experienced operators and under circumstances which take full cognizance of the basic rights we value so highly.

As with any human endeavor, it can be abused. I am confident that no one deplores any such abuses, however, any more than do the professional associations or Federal security administrators. I would hope that the subcommittee's efforts to formulate legislative proposals to counter abuses would also recognize the essential utility of the procedure.

Thank you.

Mr. MOORHEAD. Thank you very much.

The subcommittee would now like to hear from Mr. D. O. Cooke, Deputy Assistant Secretary, Office of the Comptroller, Department of Defense.

Mr. Cooke.

We will also include in the record, without objection, your attachments.

STATEMENT OF DAVID O. COOKE, DEPUTY ASSISTANT SECRETARY, OFFICE OF THE COMPTROLLER, DEPARTMENT OF DEFENSE; ACCOMPANIED BY ROBERT A. BRISENTINE, JR., SENIOR POLYGRAPH EXAMINER, ARMY CRIMINAL INVESTIGATIVE COMMAND

Mr. COOKE. We have, as you know, a rather substantial insert for the record that may be of some help to you.

With your permission I would like to summarize even my brief statement in the interest of time.

And I refer to your excellent committee report in 1966, which characterized our DOD directive, "The Conduct of Polygraph Examinations, Selection and Training of Supervision of DOD Polygraph Examiners," as being a comprehensive directive which represents a first step taken by any Federal agency to curtail the widespread use of the so-called lie detector. The report went on to observe that the directive's provisions are in harmony with most of the recommendations made by the committee.

Your report, however, did state that although the directive had strongly curtailed the use of the polygraph in criminal cases as recommended by your committee, it permits the everyday use of the polygraph for preemployment screening, an area which hardly may be characterized as falling in the definition of the most serious national security basis.

Mr. Mondello has talked about the restrictions placed in that area and the competitive service. And I would simply like to report to you that in 1972 we went further, and we barred the use of the polygraph as a screening or selection device as a condition of employment for all DOD employees, competitive service or excepted service, with the exception of the National Security Agency.

Another area of concern expressed in your committee report related to polygraph examiner qualifications. You recognize that the directive established high qualifications, but noted that it contained a grandfather clause which permitted examiners on board in 1965 to continue, even if they didn't have the training and education required to meet the high revised standards of 1965 to do the job. I would like to report to you that this problem has been resolved, at least by the passage of time. It is my understanding that there is only one such polygraph examiner remaining on Defense rolls. And he has had refresher training at late as December 1973. All the rest of our 134 examiners fully meet the rigorous qualification standards.

Incidentally, you should note that the total number of examiners in the Department of Defense had been reduced by some 296 since 1966.

Your report noted that the directive provides that appropriate supervisory officials shall review each record of a polygraph examination. Our current procedure included 100 percent quality control by highly qualified senior supervisory examiners. Let me assure you that this is not a rubberstamp operation. In each case the supervisor must make an independent review of the results. He must agree with the original examiner's conclusions before the results are certified.

We have conducted some further research into the validity of the polygraph. The results of that research have been furnished you for the record. The research projects indicate generally that the polygraph

has a high degree of validity and reliability when used as an adjunct to standard investigative procedure.

You asked whether we had any devices that claimed to have similar capabilities as the polygraph. The Department has obtained five psychological stress evaluators, and I believe one voice analyzer, solely for the purpose of test and evaluation. Our evaluations indicate that these devices are not of sufficient reliability, at least in their present state of development.

We have completed our tests, we are not using them any more. They have been turned in for disposal or have been dismantled.

You also requested information regarding the nature and the scope of the polygraph training program being given at the U.S. Army Military Police School at Fort Gordon. I have with me Mr. Robert A. Brisentine, Jr., who is the senior polygraph examiner for the Army Criminal Investigative Command. I have submitted his detailed statement for the record about our program down there. And he, of course, is available to answer your questions.

I think it is significant to note that we started out with an original training period of 8 weeks. We are now up to 14 weeks' training period. And in addition, the graduate of the school must serve an internship of from 6 months to a year before he is certified to conduct polygraph examinations by himself.

Furthermore, the school provides a 3-week refresher course for the practicing polygraph examiner.

In that package of papers I submitted to you for the record is an update of the material we previously furnished to the General Accounting Office in response to your October 1973 questionnaire.

This completes my short summary of the statement, Mr. Chairman. We, of course, will be pleased to answer any questions you may have.

[Mr. Cooke's prepared statement follows:]

PREPARED STATEMENT OF DAVID O. COOKE, DEPUTY ASSISTANT SECRETARY, OFFICE OF THE COMPTROLLER, DEPARTMENT OF DEFENSE

Mr. Chairman, I am pleased to appear again before your Committee to advise you of the developments in the use of the polygraph by the Department of Defense since your Committee report on the subject in September 1966.

That report characterized DoD Directive 5210.48, "The Conduct of Polygraph Examinations and the Selection, Training and Supervision of DoD Polygraph Examiners" as being "a comprehensive directive" which "represented the first step taken by any Federal agency to curtail the widespread use of the so-called lie detector." The report observed that the Directive's provisions "are in harmony with most of the recommendations made by the Committee."

There have been no changes to the Directive itself since your Committee issued its report. But I am pleased to be able to describe to you subsequent developments which treat some of the concerns expressed by your Committee in its report.

Your 1966 report stated "The Department of Defense Directive has strongly curtailed the use of the polygraph in criminal cases, as recommended by the Committee. But it still permits the everyday use of polygraphs for preemployment screening - an area which hardly may be characterized as falling within the definition of the most serious national security cases."

The Civil Service Commission has limited the use of the polygraph for preemployment screening of prospective competitive service employees to those agencies which have a highly sensitive intelligence or counterintelligence mission directly affecting national security and then only with the express approval of the Chairman of the Civil Service Commission. The Department has sought and received the approval of the Chairman of the Civil Service Commission for the use of polygraph in screening ten Defense Intelligence Agency competitive service employees who are detailed to work with certain Central Intelligence Agency activities. No applicants for competitive service positions in the whole Department of Defense are currently being screened by the use of polygraph examinations.

In October 1972, the Department barred the use of the polygraph as a screening or selection device or as a condition of employment for all DoD employees - competitive service or excepted service - aside from those assigned to the National Security Agency.

Another area of concern expressed in the 1966 Committee report related to polygraph examiner qualifications. The report recognized that DoD Directive 5210.48 established high qualifications but noted that it contained a grandfather clause which permitted examiners on

board in 1965 to continue even if they did not have the training and education required under the revised 1965 standards to do the job. This problem has been resolved by the passage of time. It is my understanding that there is only one such polygraph examiner remaining on Defense rolls. He has had refresher training as late as December 1973. All the rest of our 134 examiners fully meet the rigorous qualification standards. Incidentally, you should be aware that the total number of examiners in DoD has been reduced by some 296 since 1966.

Your 1966 report noted that the Directive provides "that appropriate supervisory officials shall review each record of a polygraph examination." Our current procedures include a 100% quality control by highly qualified senior supervisory examiners. Let me assure you this is not a rubber stamp operation. In each case a supervisor must make an independent review of the results. He must agree with the original examiner's conclusion before the results are certified.

Further research to determine definitively the validity of the polygraph has proceeded. Four separate research projects have been conducted under the auspices of DoD Components. In general, these projects conclude that the polygraph has a high degree of reliability. Although the DoD Joint Services Group on Polygraph Research, whose efforts were underway at the time of your

1966 Committee report, issued a report in 1968 which did not fully support this conclusion, this discrepancy is largely because the Joint Services Group did not complete its proposed validation study.

Mr. Chairman, you have also inquired about other devices that are being claimed to have similar capabilities as polygraphs. The Department purchased, solely for test and evaluation purposes, 5 Psychological Stress Evaluators. Our evaluations indicated that the Psychological Stesss Evaluator was not of sufficient reliability in its present state of development. The 5 sets have either been dismantled or turned in for surplus disposal. The DoD possesses no other types of devices in this category.

You also requested information regarding the nature and scope of the polygraph training program being given at the U.S. Army Military Police School at Fort Gordon. I have submitted a detailed statement of the program for the record and also have with me an expert witness to describe the program. Consistent with our continued effort to assure that DoD polygraph examiners meet the highest professional standards it is significant to note that the original training period of 8 weeks has now been extended to 14 weeks. In addition a graduate of the school must serve an internship of from 6 months to a year before he is certified to conduct polygraph

examinations by himself. Further, the school provides a 3 week refresher course for the practicing polygraph examiner.

Finally, Mr. Chairman, as you asked, we have furnished for the record an update of the material previously furnished to the General Accounting Office in response to the October 1973 questionnaire it undertook at your request.

This completes my statement. We would welcome any questions you may have.

[Accompanying material to Mr. Cooke's statement follows:]

FACT SHEET

Psychological Stress Evaluator

This responds to the request of Mr. Max Stettner, of the staff of the Subcommittee on Foreign Operation and Government Invormation of the House Committee on Government Operations, to Colonel Steven Harrick, Office of the Assistant Secretary of Defense (Legislative Affairs) for information with respect to the Psychological Stress Evaluator and for issuances relating to the polygraph.

The Department had procured five Psychological Stress Evaluators (PSE), at an average cost of $2150 each, for the purposes of determining their validity and possible usefulness.

The Department of the Army obtained three of the devices. It contracted for a test and evaluation project by Fordham University at a cost of $27,492.00 (copy attached). The Fordham tests found that the PSE produced valid results in less than one-third of the tests administered and its reliability was less than pure chance. As a result, the Army has dismantled two of the equipments and transferred the other to the Air Force for tests in an application not related to "lie detecting," personnel security, or investigations.

The Air Force Office of Special Investigations procured one PSE (in addition to that mentioned above obtained from the Army) for validation testing. The Air Force tests, although tentative, resulted in a conclusion that the device was not useful. This OSI device is being transferred to a Research and Development Office in Massachusetts.

The National Security Agency obtained one PSE and also a voice analyzer for research purposes. Both devices were found to be insufficiently reliable. Both have been declared surplus and made available for other research use unrelated to detection of deception.

With respect to Mr. Stetner's question about research studies concerning the validity of the polygraph and the PSE, we are attaching three studies completed in recent years: (1) Department of Defense Interagency Study of 1968; (2) University of Pennsylvania Study of 1972; and (3) The 1973 Fordham University Paper on the PSE.

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DEPARTMENT OF DEFENSE AGENCY WIDE COMPILATION OF THE COMPONENT REPLIES TO CONGRESSMAN MOOREHEAD's LETTER, May 9, 1974

POLYGRAPH AND PSYCHOLOGICAL STRESS EVALUATORS, EXAMINERS (FIRST 3 QUARTERS FY 1974)

QUESTIONNAIRE ITEMS	ARMY	NAVY	MARINE CORPS	AIR FORCE	DIS	DCA	NSA	DIA	TOTAL EVENTS & EQUIPMENT LISTINGS	TOTAL MONEY (COSTS)$
PART A. POLYGRAPH										
1. Number of Polygraph (PG) Sets (Lie Detectors)	416 (140 inoperable)	21	12	58		0	16		523	
1.a. No. of Psychological Stress Evaluators (PSE)	2 (Dismantled in May 74)	0	0	1			2		5	
1.b. No. of Other Devices having similar capabilities	0	0	0	0			0		0	
2. Acquisition Costs of Polygraph Instrument	0	0	0	$30,184			$14,657			$44,841
2.a. PSE's	0	0	0	0			0		0	
2.b. Other Devices	0	0	0	0			0		0	
3. Maintenance costs PG	$5,493	0	0	$655			$ 1,100			$ 7,248
3.a. PSE's	0	0	0	0			0		0	
3.b. Other Devices	0	0	0	0			0		0	
4. If PG Equipment Is Leased Or Use Contracted For, What Is Cost of FY 74?	--	--	--	--						
4.a. PSE Equipment	0	0	0	0			0		0	
4.b. Other Devices	0	0	0	0			0		0	

QUESTIONNAIRE ITEMS	ARMY	NAVY	MARINE CORPS	AIR FORCE	DIS	DCA	NSA	DIA	TOTAL EVENTS & EQUIPMENT LISTINGS	TOTAL MONEY (COSTS) $
5. Test, Travel, and All Other Expenses for PG Examiners, FY 74	$141,120.48	$26,568.02	$500.00	$8,780.00			$8,245.57			$185,214.07
5.a. PSE Examiners	0	0	0	0			0			
5.b. Other Devices	0	0	0	0			0			
6. If Any, How Many PG On Loan to Other Agencies?	0	0	0	1			0		1	
6.a. PSE's	0	0	0	0			0			
6.b. Other Devices	0	0	0	0			0			
7. If Any, How Many PG Borrowed From Other (Outside) Sources?	0	0	1	0			0		1	
7.a. PSE's	0	0	0	0			0			
7.b. Other Devices	0	0	0	0			0			
8. How Many PG Examinations Were Conducted by Your Agency?	2,076	457	131	399			2,288		5,351	
8.a. U.S. Military Personnel	1,449	429	131	278			0		2,287	
8.b. Civilian Employees of DoD or Components	525	22	0	22			0		569	

OUESTIONNAIRE ITEMS	ARMY	NAVY	MARINE CORPS	AIR FORCE	DIS	DCA	NSA	DIA	TOTAL EVENTS & EQUIPMENT LISTINGS	TOTAL MONEY (COSTS) $
8.c. Any others conducted (explain)	102	6	0	99			2,288 (Screening)		2,495	
9. How Many PSE Examinations (Tests) Were Conducted by Your Agency in FY 1974?	0	0	0	0			0		0	
10. How Many Examinations (Tests) Using Other Devices Were Conducted by Your Agency in FY 1974?	0	0	0	0			0		0	
11. How Many PG Examinations Were Conducted By Other Agencies, Public, Private, Or Contract, At The Request of Your Agency in FY 1974?	0	0	0	0	9		0		9	
12. How Many PG Examiners Are Certified In Your Component?	61	9	17	27			20		134	
12.a. PSE's	0	0	0	0			0		0	
12.b. Other Device Examiners	0	0	0	0			0		0	

QUESTIONNAIRE ITEMS	ARMY	NAVY	MARINE CORPS	AIR FORCE	DIS	DCA	NSA	DIA	TOTAL EVENTS & EQUIPMENT LISTINGS	TOTAL MONEY (COSTS) $
13. How Many PG Examiners Have Such Duty as Primary?	32	9	0	1			7		49	
13.a. PSE's?	NA	0	0	0			0			
13.b. Other Device Examiners?	NA	0	0	0			0			
14. Have You Promulgated Any Interdepartmental or Agency Directives, Administrative Orders, Rules, Regulations, or Instructions, pertaining to Such Devices During FY 1974? If so, provide copies.	New CIDC Reg	No	No	No			No			

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HANDBOOK OF PSYCHOPHYSIOLOGY

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ON THE DETECTION OF DECEPTION*

A MODEL FOR THE STUDY OF PHYSIOLOGICAL EFFECTS OF PSYCHOLOGICAL STIMULI

19

It is widely believed that lying is accompanied by specific perceptible physiological or behavioral alterations. Thus a mother tells her child, "Look at me," in order to assure his telling the truth, because she believes that lying is associated with averting the gaze. Other idiosyncratic behavioral manifestations may be recognized by those close to an individual when he purposefully decides to lie. These may include signs of tension, agitation, respiratory changes, a catch in one's voice, blanching, blushing, etc. In addition to physiological changes readily visible to an observer, more subtle ways of determining physiological responsivity may be used. In ancient China an individual was required to speak with his mouth full of rice in order to test the truth of his statement (Boring, 1942). This rather primitive "lie detector" might have worked, in some instances at least,

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because emotion could interfere with salivation, thus differentially increasing the liar's difficulty in enunciating under those circumstances. (See Larson, 1932, for an excellent review of the history of the detection of deception.)

Shortly after the turn of the century, modifications of Galton's (1879) word association technique were used to detect lying by investigating associations and differential reaction times to stimuli associated with material about which an individual hopes to deceive (Jung, 1906; Wertheimer & Klein, 1904). Somewhat later, Luria (1932) showed that psychomotor coordination can be impaired while lying, using a technique which required subjects to hold one hand steady while depressing a plunger with the other. These techniques, while of theoretical interest, have had very limited practical application. It remained for Keeler (1930) to develop and combine the work of several previous workers in a simple polygraph to measure physiological responsivity as a technique for the detection of deception. His device measured respiration, "relative blood pressure," and the galvanic skin response (GSR).

PRINCIPLES UNDERLYING THE DETECTION OF DECEPTION

Despite the widespread use of the polygraph technique by police, governmental agencies, and industry to detect deception, considerable misunderstanding persists about its mode of operation. Contrary to popular superstition, no specific physiological response has ever been identified that is unique to lying. On the contrary, the kinds of behavioral and physiological responses associated with deception are also characteristic of arousal, anxiety, stress, etc. The detection of deception depends upon a comparison of the subject's responses to two or more stimuli matched in their presumed ability to arouse the subject. Some of these stimuli are known not to be associated with deception, whereas one or more of the others may be associated with deception. If the individual's responses to these basically similar stimuli are considerably different in the case of those stimuli about which deception is suspected, a diagnosis of lying is made. The parameter on which this comparison is made can range from reaction time (as in Jung's experiments); to psychomotor coordination (as in Luria's); and to physiological parameters, as in a more typical "lie detection" procedure. Regardless of the parameter being measured, the model remains a comparison of matched stimuli, one set of which may involve deception. The procedure rests on a number of assumptions, which include an adequate matching of stimuli, as well as differential responsivity on one or more of the parameters being measured.

The Usefulness of the Paradigm

It is striking that a phenomenon such as the detection of deception has received so little systematic investigation. Perhaps this is partly explained by the psychologist's irritation with laymen who characteristically refer to all polygraphs as "lie detectors." Yet the phenomenon is probably a fundamental paradigm for psychophysiology. Consider the card test, a demonstration used both in certain field applications and in laboratory studies. A subject is asked to select and remember one of six cards. As the experimenter names each of the cards, he is required to answer "No" each time, thereby "lying" about the card he actually did select. The physiological response (typically GSR) to each of the stimuli is compared with the other responses and, under appropriate conditions, the greatest GSR will have been evoked by the card selected. Such a simple procedure remains one of the best illustrations of psychosomatic relationships. One assumes that prior to the selection of any one card, each of them would have evoked an essentially similar response, whereas afterward a greater physiological response is elicited by the card that has been selected. The process of selecting the card, then, differentially alters the individual's physiological responsivity to it. This procedure presents a rather simple way of studying the differential effect of past experience on the physiological responsivity of the individual. It should be emphasized that this simple procedure will not automatically guarantee that the greatest physiological response is associated with a selected card. On the contrary, as will be discussed later, situations varying the consequences of deception, the kind of response required of the subject, his antecedent

experience, the kind of parameters being tested, etc., will dramatically affect the incidence with which a selected card will evoke a differentially greater physiological response.

It is possible, therefore, to view the apparently simple detection of deception situation as a meaningful way of investigating the contingencies under which an apparently matched stimulus can, by specifiable previous experience, become capable of arousing differential physiological responsivity. Whereas in most psychophysiological research one attempts to infer the fact that a stimulus has been meaningful from the physiological response of the individual, this paradigm allows an investigator to specify the meaningful stimulus (i.e., the selected card) and determine the particular kind of psychological situation under which it will lead to a differentially augmented physiological response. As will be shown later, psychological rather than physiological factors tend to determine the presence of differentially greater responsivity. This paradigm then becomes a technique for systematically investigating the contingencies under which previously neutral stimuli become capable of eliciting alterations in physiological responses.

Sources of Information Concerning the Detection of Deception

There are essentially two bodies of literature dealing with the detection of deception: a small number of studies by psychologists published in professional journals and a relatively large number of manuals, journals, and reports written by "professional lie detection experts." The concerns of these two groups have, as a rule, been dissimilar. The practitioner involved in "lie detection" tries to structure a situation in which he can successfully make a diagnosis of deception. His concern typically centers about reducing the number of cases in which he cannot make a clear-cut decision in his own mind on whether an individual is guilty or innocent. Because of a variety of reasons, not the least of which is the technical difficulty of establishing "truth" in an absolute sense, few reports deal with attempts at validating findings. No attempts are made to vary procedures in a systematic fashion, in order to establish the relative contribution of different aspects of the procedures to the diagnosis of deception. The diagnosis of guilt or innocence is not typically made on the basis of a single measure or test, but represents a global decision, including all of the information known about the case.

In direct contrast to reports from the field are laboratory studies that are characteristically concerned with varying procedures and studying the effect on detection, using explicitly defined criteria as dependent variables. Not only are the motivations of subjects and the context in which these studies are carried out different, but neither the procedures nor the dependent variables are readily comparable. The problems raised by using, in one context, the data derived from another will become more evident in later sections. It seems most appropriate to discuss the field situation separately, since it is more closely akin to a clinical art developed by practitioners who are faced with the task of making the diagnosis of deception. In order to evaluate the field situation, it is necessary to appreciate the context in which the detection of deception is carried out, the procedures that are utilized, and the kinds of criteria that are employed.

LIE DETECTION IN THE FIELD

Typically, "lie detection" procedures are carried out by individuals who are trained interrogators but who may have only limited formal training in psychology, psychophysiology, and related fields. The technology has developed empirically, largely through the influence of Keeler (1930), his associates and successors, Inbau and Reid (1953), and Backster (1963). A body of knowledge, phrased in interrogation terminology, has been developed to explain and teach the rationale and the application of this technique. Usually, the interrogators have taken one or more courses from individuals who have had considerable experience with the technique. Currently, various attempts are being made to specify standards of training for interrogators who are to use this procedure.

Polygraphic interrogation techniques have been used in three major contexts: (*a*) the interrogation of suspects during criminal investigation procedures; (*b*) the screening of individuals for security

purposes in the government; and (c) the screening of individuals who are or may be placed in positions to convert goods or defraud their employers on a more or less routine basis, in order to identify individuals guilty of crimes, who might not otherwise be detected.

Interrogation Procedure

For a detailed discussion of various procedures the reader is referred to Reid and Inbau (1966). It seems useful, however, to summarize certain aspects of the procedure. We shall describe the situation characteristic of lie detection in the context of criminal investigation. Typically, the polygraph operator sees the suspect in a relatively quiet, plainly furnished, comfortable office. He is acquainted with the suspect's dossier and has obtained as much factual information as he can. He is introduced to the suspect and is usually alone in the room with him, although the interview may be recorded and observed through a one-way screen.

The pretest interview Once the interrogator meets the suspect, he explains that he will shortly conduct a polygraph examination and that the "lie detector" is a scientific instrument which will record his physiological reactions and indicate when he is lying. He tends to state flatly that this can be done with certainty, implying that deception is pointless because the record will reveal this deception. A concerted effort is made to structure the interview as an opportunity for the suspect to prove himself innocent by telling his side of the story. The machine is usually visible in the background but is not directly mentioned at this point. The whole tone of the initial conversation is designed to maximize the suspect's belief in the infallibility of the "lie detector," a belief that, to some extent at least, tends to be shared by the interrogator. In the context of the impending polygraph examination, the interrogator goes over the material in the suspect's history. Since he is trained in his task, he will typically sympathize with the suspect, provide face-saving rationalizations for any crimes that might have been committed, and indicate subtly that he can understand how someone might murder but that lying is the lowest form of degeneracy. Such a procedure may sound farfetched, yet in the hands of an expert it is remarkably convincing. Against the background of the forthcoming examination, he goes over all of the crucial points and at various stages casually indicates that the suspect might as well tell the truth now, since it will certainly come out later, and that by confessing he will earn the interrogator's respect.

Unlike other interrogation procedures, inconsistencies in the suspect's answers and possibly deceptive replies are not challenged by the interrogator during the pretest interview, except perhaps subtly during the course of formulating questions. It is important that the suspect not feel that the interrogator is trying to obtain admission of guilt, but merely eliciting information essential for the conduct of an adequate examination. This behavior is quite different from the usual behavior of an interrogator, where inconsistencies are used as leverage to force the suspect to reveal the truth. Since interrogators are trained to bear down when they suspect deception, and the pretest interview specifically prohibits such behavior, many polygraph practitioners are genuinely convinced that interrogation is not the real purpose of this interview. The examiner's belief that this is the case helps maximize the effectiveness of the interview, which often, in fact, elicits unexpected admissions of guilt prior to the actual test. It is, of course, a matter of semantics whether one wishes to consider these cases as examples of successful lie detection. While the polygraph record does not lead to the detection of deception in these instances, the existence of the polygraph creates a context without which a confession might not have been obtained.

The interrogator will then carefully discuss with the suspect the questions he will ask. There are, of course, different procedures used by different individuals in this regard but the most widely used procedures, "peak of tension," "zone of comparison," and their various adaptations, all employ a similar pretest strategy. Approximately 12 questions are usually formulated, including a number of known, neutral control items such as: "Is your name John Doe?" "Are you now in the United States?" "Is today _____?" Also included will be certain questions designed to elicit a nonspecific emo-

tional response, questions such as: "Have you ever stolen anything?" Finally, two or three crucial questions relating to the specific purpose of the interrogation will be included.

The interrogator will go over these questions in detail with the suspect, defining for him exactly what each aspect of the question should mean, to be certain that it will not be necessary for him to lie unless he is guilty. The pretest interview and the discussion of the questions to be asked during the test provide an unusual opportunity to elicit information. The interrogator usually approaches the suspect in a very calm, matter-of-fact fashion. The questions he asks in the process of clarifying the subsequent "lie detection" test are for the ostensible purpose of protecting the individual from giving a false guilty response.

The formulation of questions The formulation of appropriate questions is considered to be a crucial part of the procedure. It is in the formulation of questions that an attempt is made to take into account the individual's overall state of tension. An innocent individual may have cause to be highly aroused and very frightened in the test situation. The interrogator will attempt to include several emotion-arousing questions, not related to the specific crime, in order to have an estimate of the individual's responsivity to embarrassing questions. In an examination concerning a particular murder, for example, he might ask the individual about some other murder. This second murder might well be a fiction made up by the interrogator but to the innocent suspect it will be as real as is the first murder. Asking about a fictitious murder permits the interrogator to compare the responses to the two questions about the murders, one in which the suspect is known to be innocent and the other in which his involvement is questioned. It is, of course, essential that the interrogator ask questions in a manner which convinces the person that he is really suspected of each crime.

In an ideal case, some crucial questions may be asked about material that is known only to the guilty person and the interrogator. If, for example, the murdered person has been stabbed with a letter opener, and this fact has not been released to the public, questions may be formulated asking whether the victim was shot, strangled, or stabbed. The innocent individual's responses should be similar for all these questions, whereas the guilty individual can be expected to respond differently to the relevant item.

It is difficult to provide a real picture of the pretest interview that is such a crucial part of "lie detection." This interview carried out prior to the test, with the machine discreetly in the background and yet very much present as the ultimate scientific arbiter of truth, is useful not only to elicit information but also allows a quasi-alliance to be formed between the interrogator and the suspect vis-à-vis the machine. The very process of formulating questions and clarifying them with the suspect is immensely effective in maximizing the conviction that the machine will, in fact, detect lying unless both the interrogator and the suspect make absolutely certain that no lie is involved. In this context, a lie is carefully defined. As an example, an individual might be accused of stealing several hundred dollars from his employer. During the pretest interview, the interrogator asks him about a previous job in a supermarket. While formulating the questions, the interrogator asks, "Did you ever steal from the market?" If the suspect says, "No," the interrogator asks, "Did you ever, for example, run out of cigarettes and take a pack off the shelf?" If the suspect admits, after a few minutes, that he probably has, although he cannot remember specific instances, the interrogator then asks whether perhaps he might have helped himself to some cookies from a broken package. Again the suspect might admit that this could have happened. The interrogator then explains that this is not what was meant by stealing, but that stealing meant only the actual taking of money or merchandise of significant value, say in excess of $5, for his own use or to sell. He would not, then, mean an occasional cookie, cigarette, or piece of chewing gum. Thus he says, "When I ask you, 'Did you ever steal from the market?', you now know that I will be referring to taking merchandise valued in excess of $5 or to taking a similar or greater amount of money." Note that the interrogator apparently takes great care to prevent the suspect from giving responses not elicited by the issue in question. In so doing he implies that it is vital that there be no confusion about the

meaning of the questions, lest the polygraph pick up lying, and, incidentally, that he, himself, has some understanding of trivial transgressions. He provides ample opportunity for the suspect to mention that he might have stolen, just so that there will be no confusion, since this stealing was quite irrelevant to the crime under investigation. The situation is so designed that a truthful interchange seems obviously essential for the suspect's own good.

Only after the questions that are to be asked have been carefully worked out does the actual examination begin. The pretest discussion may take an hour or more. It is emphasized that the suspect should be put at ease as much as possible prior to the examination; he should be properly rested and not medicated. The pretest interview is intended to reassure the suspect about the infallibility of the polygraph, in the hope that this will reduce the anxiety of the innocent and maximize the responsivity of the guilty.

The test procedure The typical commercial polygraph measures respiration using a pneumograph, a form of occlusion plethysmography of the arm often erroneously called "relative blood pressure" because it uses a pneumatic system with a blood pressure cuff,[1] inflated to a point midway between systolic and diastolic pressure, and GSR with simple, stainless steel electrodes without paste. Because the inflated blood pressure cuff soon becomes uncomfortable, the actual test is limited to about 10 or 12 questions taking only about 2 or 3 minutes.

After the polygraph has been attached, the interrogator may demonstrate its use by asking the suspect to select one of a number of cards and requesting that he answer "No" to all questions about these cards, forcing him to lie. He will then run through a number of questions concerning which card the suspect selected. At the conclusion of this demonstration, he will invariably be able to tell the suspect which card he selected. Certainty is possible in this instance because the interrogator ascertains the card in advance, the purpose of this procedure being to underline the infallibility of the polygraph. While a card test helps in these measures, it is far less important—or effective—than the pretest interview. If it is felt that the suspect already has the right attitude, the card test may be omitted.[2]

During the actual test the suspect is seated so that he cannot see the record on the machine or the interrogator. Each of the questions the suspect is to answer has been discussed in detail in advance and is formulated to require a simple "Yes" or "No" answer. The interrogator waits long enough between each question to allow the three measures to return to a fairly stable baseline. After the interrogator has gone through the 12 questions once, the blood pressure cuff is deflated, and the suspect is given a rest period which, however, may be used as an integral part of the procedure. If, for example, a response to some item suggests guilt, the interrogator may well ask the suspect about it, in an attempt to account for this physiological response. Here again the interrogator takes the role of trying to help the suspect vis-à-vis the machine. In the case discussed earlier, for example, the suspect might have shown a reaction to the question, "Did you ever steal from the supermarket?" The interrogator might say, "Look, what really happened? You didn't tell me. You have a response there." The suspect may then recall that on one particular day he did, in fact, take $10 because he was short of money. He might say that he had always meant to return the money and hadn't thought of it as theft but he didn't get around to it. The interrogator might then say, "Fine, now let's be clear that the next time I ask you about this we will not think of stealing as meaning this $10 which you borrowed and intended to return." The test is then repeated, after clarifying what is meant by stealing, and the physiological response previously associated with the question may now no longer be elicited. Any apparent unexplained responses in the test are utilized in this manner to elicit more information. Such, of course, is also the case for the material concerning the crime. In most cases, the suspect is tested at least twice on the questions. Between the first and second tests, however, the interrogator may attempt to have the suspect reconcile and

[1] See p. 764 for a further discussion of this point.

[2] This test may instead be given following an initial examination on the relevant material.

explain the reason for any undue physiological response that might indicate knowledge of the crime.

Scoring The scoring of the physiological parameters is not specified in quantitative terms. Although examples of various types of deceptive responses are given in sources such as Reid and Inbau (1966), it is difficult to say that they indicate much more than an undue response. A change in respiration, blood pressure, or GSR beyond what would seem normal is considered important, but no specific physiological change is uniquely associated with lying. Instead, deception is diagnosed by comparing the subject's response on relevant items with his response on items that should be equally arousing or anxiety-provoking to an individual who is not lying.

If some particular item of information is available that would be known to the suspect but not to an innocent individual, the "peak of tension" technique may be used. In this procedure, a series of questions is asked in an order previously established with the suspect; the crucial item is typically placed third or fourth. The operator looks for a gradual increase in the amount of tension elicited by each item as the crucial one is approached and a sudden relaxation once it is passed. Items of information that involve numbers are particularly suited to this procedure. If, for example, $212 were taken in a theft and this amount is not generally known, the suspect might be asked, "Was the amount taken $56, $102, $160, $212, $418?" The suspect who knows the correct amount should not only show his maximal response to $212 but also demonstrate a gradual increase in tension that peaks at $212, with a sudden relaxation as the crucial item is passed.

Screening procedures When the polygraph is used in screening employees or prospective personnel, the procedures are much the same as in criminal investigations but there are certain differences. The problem facing the interrogator in a criminal case is to develop appropriate control questions to enable him to interpret the responses to questions concerning the crime. In screening, the interrogator does not have a set of ready-made questions about a specific event. The interview for pre-employment (or "routine" screening) is designed to discover whether or not the particular person being tested is guilty of certain transgressions, involvements, or tendencies that would render him unsuitable for the position. The polygraph, then, not only serves as a powerful lever in the pretest situation but serves as an "independent" measure of the veridicality of statements concerning the questions asked. The kinds of issues that are explored in the screening procedure tend to include material of a private, personal, and confidential nature, which under most circumstances would not legitimately be viewed as relevant to an individual's normal employment. The use of the polygraph in screening has been subject to considerable criticism (House of Representatives, 1964). The issues, however, relate less to its utility in such a context than to the kinds of questions explored. It should be realized that the questions asked, rather than the attempted validation of the answers, are objectionable to individuals. The issue of what aspects of an individual's life may be searched, and under what conditions, either by an employer or by the government, is an ethical and moral problem, separate from the problem of the effectiveness of the instrument and, therefore, beyond the scope of this presentation.

Evaluation of the Technique

When one considers the use of the polygraph in a real life situation, it becomes clear why it is difficult to evaluate. The interrogation procedure is an art rather than a science—much depends upon the manner in which the individual interrogator formulates his questions, the tone of his voice, and the subtle cues he may provide in the interrogation, etc. The experienced interrogator must intuitively deal with problems inherent in such issues as individual differences in reactivity, response specificity, and the overall state of the person being questioned. Interrogators who have worked with "lie detection" will readily admit that the psychological edge the machine provides during the pretest interview is, from their point of view, of major importance. Some go on to say that, even if the machine were out of order, it would still be a major asset. Scientific evaluation of the validity of the "lie

detection" procedure is very difficult, since the test itself is only a small part of the total procedure, and much of the interrogator's attachment to the polygraph undoubtedly is related to the psychological effect it will have on the suspect.

In the past, the literature on "lie detection" written by the professional expert has tended to emphasize the scientific aspect of this technique. The polygraph is presented to the suspect as a scientific way of recording his physiological responses, which indeed it is. It is also implied—and at times even stated—that the polygraph is a scientific way to record lying. No adequate evaluation of the validity of the polygraph in this regard is yet available (Orlansky, 1962). Perhaps there has been an unfortunate disinclination toward evaluation by practitioners in this area, yet it must also be acknowledged that to do so is extremely difficult. How does one appropriately determine percentages of correct detection? Assume that one individual admitted a theft and polygraph examinations were carried out among 100 suspects, with all individuals apparently innocent; does this justify the claim of 99% accuracy that has been made in one instance? If, indeed, the interrogator considered the contingencies in each instance to be 50-50 instead of 100 to 1, such a claim might not be quite as absurd as it seems.

In evaluating "lie detection," it would perhaps be most appropriate to ask not how well the procedure works under ideal circumstances but rather to consider the whole technique as a unit—the interrogator, the test, and his interpretation of the test—and ask how effective this combination is in determining the truth. In the absence of any satisfactory way of establishing what truth really is, such an evaluation cannot be carried out. To validate against a jury's decision of guilt is a dubious procedure at best since criminal trials are adversary proceedings carried out in a highly formalized manner. The courts are, of necessity, more concerned about making certain that only legally obtained evidence is used according to correct procedure than in the guilt or innocence of any one particular individual. The purpose of a jury is to provide a socially useful criterion of fact in the absence of more reliable ways of determining truth. A panel of experts evaluating all of the facts in a case, including those inadmissible in court, might be more accurate. A criterion measure of this sort was employed by Bersh (1969), who found better than 90% agreement between polygraph examiners' judgments of deception, based on both examinations and knowledge of details of the case, and unanimous judgments of guilt made by a panel of four Judge Advocate General attorneys. This panel independently reviewed case files from which all polygraph material was deleted. Bersh felt that such a panel provided the best practical criterion against which to compare examiner judgments. Although an excellent study, errors of classification are possible, even with such a panel. Other ways have been proposed to validate the procedure. These include subsequent confessions, the uncovering of evidence that would prove innocence after the test, and uncovering circumstantial proof of crimes by such a procedure. Each of these presents serious problems. In real life, polygraph examinations given during a period when some doubt as to guilt exists are seldom those in which such doubt is subsequently resolved.

An evaluation of the total procedure in such a retrospective fashion is greatly complicated by the fact that the procedure has an effect on the disposition of the case; thus in some instances the fact that a suspect appears to be telling the truth during a polygraph test is the basis upon which further investigation is deemed unnecessary. Obviously, a high correlation between apparent innocence on a polygraph examination and innocence in real life is virtually guaranteed. The same problem exists in the determination of guilt or lying. As has been pointed out, the interrogator has available to him as much information as possible and this information will include the investigative findings and convictions of his colleagues about the guilt of a suspect (Orlansky, 1962). These beliefs and convictions could certainly bias the interpretation of the records.

If the bias affected only the interpretation of the polygraph record, it would be possible to circumvent this bias by blind analysis of the records or a reevaluation by judges after the fact. The problem is far more complex. The procedure is by no means standardized, and the importance of the pretest interrogation in making the test itself work is uni-

versally acknowledged. The importance of formulating proper questions is also stressed in all of the literature written by "lie detection" experts. Since the technique depends upon the comparison of physiological responses to critical questions with those to control questions, the choice of control questions is of crucial importance. The manner in which questions are asked can certainly influence the physiological response. The interrogator wishing to obtain a record with physiological evidence of deception is likely to be able to do so. In view of the work by Rosenthal (1966) on experimenter bias, it seems extremely likely that the interrogator could unwittingly communicate some aspects of his conviction to the subject. In fact, suspects whom the interrogator believes to be innocent might well be taking quite a different test from that taken by those about whom the interrogator has strong convictions regarding their guilt. If there were some way of knowing absolute truth and if one could evaluate a large series of decisions for their accuracy, this issue would be less serious. In any retrospective attempt at evaluation, however, where one is using primarily the polygraph record itself, it cannot be ignored. The extent to which experimenter bias enters into a decision can be investigated. It is possible to ask polygraph operators to administer examinations to individuals who are definitely innocent, and by providing accurate, but slanted, investigative material convince the interrogator that the individual is probably guilty. A group of individuals tested in this fashion would yield evidence about the extent to which the polygraph examiner might unwittingly bias the test in actual practice. It would not be possible to obtain evidence about the effect of the interrogator's conviction of innocence on the guilty subject's record, but this is perhaps of less concern than false-positive tests.

Experimenter bias is not the only factor that may cause innocent individuals to be classified as guilty. An excellent example of the problem is cited by Dearman and Smith (1963), in which an individual felt guilty about legitimate financial dealings and was, as a result, suspected of stealing from his employer. Research directed at the problem of false-positive classifications seems of great importance.

The reliability of the procedure may also be evaluated. The record of physiological responses that is obtained can be examined by different individuals and judged as to whether deception is or is not present. Such studies, although not presently available, would seem feasible. A high degree of concordance in judgments, however, would in no way deal with the problems of validity outlined. It seems likely that different practitioners develop different feelings of what might be indicative of deception, partially based on an awareness of the kind of interrogation they carried out. The importance of interrogator reliability about the purely physiological evidence of lying could thus be overestimated.

No fully satisfactory way is available at this time for evaluating the overall effectiveness of the technique, and it is probable that no such answer will be forthcoming in the near future from real life situations. Perhaps most sensibly, one must compare the total technique with alternative ways of ascertaining whether an individual is telling the truth. One could, for instance, compare the effectiveness of clinical interviews with that of polygraph interviews, although no comparative data are yet available. In the clinical setting, the professional makes certain that there is little if any advantage to the patient in lying. The interrogator questioning a suspect, however, tends to feel that the polygraph yields a considerable increment to his effectiveness. Just what proportion of this increment is based on the physiological record, and what proportion on the psychological leverage provided by the technique itself, remains an open question.

Ethical issues, as well as practical ones, are raised by the use of polygraphs in a real life situation (Sternbach, Gustafson, & Colier, 1962). Whether such a technique ought to be used is beyond the scope of a scientific discussion. The matter of whether or not the technique works is, however, subject to scientific inquiry. If, as the preponderance of evidence seems to indicate, the technique is effective—at least more effective than alternative methods of ascertaining truth—it still remains to be determined how accurately and under what conditions. It should be noted, however, that were further research to establish a technique which is 100% effective in determining the truthfulness of

a statement, the ethical difficulties would not be diminished. Thus wire-tapping, when it yields incriminating evidence, is 100% effective, but by no means does this accuracy resolve the ethical issues raised by its use.

LABORATORY RESEARCH

The mechanisms involved in the detection of deception are subject to laboratory research, although major differences exist between laboratory situations and those in the field, and inferences from one to the other will need to be drawn cautiously (Orne, 1969). Yet, to the extent that we are investigating mechanisms, they may be meaningfully explored under controlled conditions. When the polygraph is used for criminal interrogation, security screening, or in pre-employment interviews, the consequences of the test are significant and real. These consequences are in sharp contrast to those in most laboratory research, where the consequences of detection tend to be minimal. Even if they are maximized by experimental manipulations, they tend to be from a universe of discourse different from that of the field situation. These differences in consequence are by no means the only differences, however. Researchers have rarely used situations that are comparable in any way to those found in the field. The tendency has been to use the kind of situation characterized by the card test described earlier. The subjects are asked to select one of several cards and then requested to lie about the identity of the one selected. The GSR to the selected card is typically compared with that evoked by cards not selected. Occasionally, investigators such as Lykken (1959), Kubis (1962), and Davidson (1968) have used a pseudocrime which is enacted by the subject, or in which he might participate. Here, again, a fixed number of stimuli are given to the subject, stimuli that include some highly relevant to the crime he observed and others less relevant to it. In the laboratory experiment, therefore, the formulation of questions characteristic of the field situation and a discussion of the reasons for a suspect's undue response are replaced by the use of closely matched stimuli. The psychological leverage characteristic of the field situation is typically not exploited in the laboratory. With some exceptions (Ben Shakhar, Lieblich, & Kugelmass, 1970; Kugelmass & Lieblich, 1966), the subjects tend to be college students, a group that differs markedly from the clients of the "lie detection" experts. Finally, the relationship between the experimenter and the subject is radically different from that of the interrogator and the suspect.

The Effect of Motivation

In a field situation the suspect's concern about the test and its consequences for him may be taken for granted. The consequences of being detected have been emphasized repeatedly as significant determinants of detection (Burtt, 1921; Chappell, 1929; Marston, 1917). Because this view is widely held, a number of investigators have offered rewards to subjects who could successfully deceive during a polygraph examination (Davidson, 1968; Kubis, 1962; Lykken, 1960), or have administered electric shock during the experiment, presumably to increase the affective response to the relevant question (Lykken, 1959). The effectiveness of such manipulations is not known, however, since these investigators have not compared the detection rates obtained under these circumstances to those which have been obtained without such motivating techniques.

In a study designed to explore the role of motivation as a determinant of detection, Gustarson and Orne (1963) compared two groups of normal, paid college volunteers in a card experiment, using GSR as the response variable. Both groups were asked to select one card and were then played a tape recording that included a reference to the critical card, as well as to control cards. Before selecting the card, one of the two groups listened to a tape that contained the following information: (a) the experiment was designed to see how well the subject could keep information from the experimenter; (*b*) that this was extremely difficult and only persons with superior intelligence and great emotional control could succeed; (*c*) they were to try as hard as they could to beat the experimenter and the equipment; and (*d*) if they were successful, they would be paid an extra dollar. The experiment was carried out in a very impersonal fashion. Detection rates were found to be no greater than chance in the control group but significantly greater than

chance in the motivated group. It would appear, then, that detection is in large part a function of the subject's *attempt to deceive* and that incentives to do so result in an increased ease of detection.

On the basis of these findings it could be hypothesized that motivated subjects who are told they had not been successful in their attempt to deceive, and who are thereby even more highly motivated to escape detection, are more easy to detect. This logic would seem to be the implicit assumption underlying the use of the card test in a field situation, where the interrogator goes to considerable pains to convince the subject of the virtual infallibility of the polygraph in the hope of maximizing the differential responsivity.

The wide use of the card test in field situations makes the results obtained by Ellson, Davis, Saltzman, and Burke (1952) puzzling. In a study on the consequences of previous detection, they report that subjects detected on an earlier trial and informed of this fact are more difficult to detect on a subsequent trial. Gustafson and Orne (1965a) attempted to resolve this apparent paradox. They observed that there is a widely held conviction among college students that lie detection techniques are effective with all normal subjects, and that only habitual liars or psychopaths fail to be detected. In a laboratory situation, therefore, subjects might be motivated to be detected. Once they had obtained proof that detection was possible, their level of motivation would decrease, and they would then become more difficult to detect. If they were given proof that they were not detected, however, their concern about possibly having psychopathic tendencies would heighten the level of motivation and facilitate detection. In a real life context, any such problem would be overshadowed by concern for the consequences of detection, so that the results might be reversed.

To test these concepts, Gustafson and Orne (1965a) designed a study using GSR as an indicator of deception. Two groups of subjects were treated identically, except for different pre-experimental instructions designed to create two different mental sets toward the experiment. One group was told: "This is a study of lie detection. As you know, a lie detector is a scientific instrument. However, psychopaths and habitual liars are very difficult to detect. In the study we are assessing the adequacy of the technique. We want you to try to fool the lie detector. It is your job to fool the machine. Good luck!" The other group was presented a tape with motivating instructions similar to those employed in the earlier study, omitting only the monetary reward. The tape said: "This is a study in lie detection. Only very stable and emotionally mature individuals are able to fool the lie detector. We want you to try your best to fool the machine.

TABLE 19.1 SUCCESSFUL AND UNSUCCESSFUL DETECTION ON THE FIRST TRIAL OF SUBGROUPS TRYING TO BE DETECTED OR TO DECEIVE[a,b]

	Feedback		
Motivation	*Told detected subsequently*	*Told not detected subsequently*	χ^2 *between feedback groups*
"Need to be detected"			
Detected	9	13	1.31
Not detected	7	3	n.s.
"Need to deceive"			
Detected	13	11	0.17
Not detected	3	5	n.s.
χ^2 between motivation groups	1.31 n.s.	0.17 n.s.	

[a] The subjects were informed about the success of detection only after the trial yielding these data.

[b] A multiple square contingency analysis (Stuart, 1957) was used to determine the departures from expected frequencies in the entire table. Neither the chi-square components for each variable alone nor the interaction between variables was significant.

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Good luck!" All subjects were shown cards with numbers and were asked to select one, apparently without the experimenter's knowledge. A tape recording was then played on which all the possible numbers were repeated in the form of questions. The subject was instructed to reply "No" to each number, so that one of his responses would necessarily be a lie. Table 19.1 illustrates that on this first trial the two groups were not significantly different.

After the first trial, regardless of the subject's actual physiological responses, the experimenter entered the room and told half the subjects what their card had been—thus indicating that they had been detected. To the other half, the experimenter named the wrong card, so that they believed they had gone undetected. A second trial was then given to each subject in order to determine the effect of feedback on subsequent detection. Table 19.2 summarizes the findings.

The two groups showed exactly opposite reactions to the same information. For those subjects who had been striving to be detected because "psychopaths are difficult to detect," the information that they had been detected eliminated the differential responsivity the next time that they were required to lie. The identical information given to those subjects who hoped to go undetected because "only mature and stable individuals are able to fool the lie detector," however, greatly augmented the response the next time that they were required to lie, making their detection much easier. Exactly the opposite result occurred when the experimenter purposively picked an incorrect card, communicating to the subject that he had effectively deceived the machine.

It should be emphasized that the physiological criterion for detection was the GSR, objectively scored, and that the experimental treatment was identical for both groups once the pre-experimental instructions had been given.

These findings illustrate the problems of inferring from laboratory findings to the field situation. Clearly, the identical experimental treatment and stimulus conditions can yield exactly opposite results depending upon the subject's attitude and set as he enters the experiment (Orne, 1962). In the above study, the subject's set was manipulated, but in many studies it is not investigated and can be inferred only with difficulty. In the field situation the individual's beliefs, attitudes, and sets are of great importance, but the suspect's motivations tend to be to prove himself innocent. A similar motivation must be assumed for laboratory studies from which we expect to draw inferences to a real life context. Recent work by Thackray and Orne (1967) underscores the need for care in generalizing about motivation. In the context of one of several studies altering the consequences of detection, the

TABLE 19.2 SUCCESSFUL AND UNSUCCESSFUL DETECTION ON THE SECOND TRIAL OF SUBGROUPS TRYING TO BE DETECTED OR TO DECEIVE[a]

	Feedback		
Motivation	*Told detected*	*Told not detected*	χ^2 *between feedback groups*
"Need to be detected"			
Detected	4	14	10.28
Not detected	12	2	$p < .005$
"Need to deceive"			
Detected	15	3	15.36
Not detected	1	13	$p < .001$
χ^2 between motivation groups	12.96 $p < .001$	12.55 $p < .001$	

[a] A multiple chi-square contingency analysis here shows that neither feedback nor motivation have significant effects by themselves. The relevant chi-square values calculated from partitioned subtables are .25 ($p > .95$) and .01 respectively ($df = 1$). However, successful detection does depend significantly on the interaction between feedback and motivation ($\chi^2 = 30.94$, $p < .001$, $df = 1$).

Note.—Reprinted after an article by Lawrence A. Gustafson and Martin T. Orne published in the December 1965 *Journal of Applied Psychology*. Copyrighted by the American Psychological Association, Inc., 1965.

subjects were administered "need to deceive" instructions and then were divided into several subgroups receiving differential feedback of information regarding the polygraph's effectiveness. The subjects receiving information that they were detectable were easier to detect in a subsequent interrogation than those subjects who believed that they were not detected. This difference was true, however, only for the later part of the interrogation. These studies used a situation in which an attempt was made to create a high degree of subject involvement. It is possible that, when a high level of arousal exists, the effect of differential feedback of information may be masked, becoming evident only after the subjects habituate sufficiently to the interrogation procedure. In summary, it appears that not only degree of subject motivation but the object of the motivation as well are important determinants of deception. The task that the subject perceives to be his in an experiment and the subject's perception of the total situation can exercise a profound influence on the outcome of an experimental treatment.

The Experimental Paradigm in the Detection of Deception

As has been indicated earlier, no specific physiological responses are pathognomic of lying. If one asked a suspect, "Did you murder Mr. X?" and observed a physiological response to the question, one could not infer deception, since any suspect could be expected to respond to such a question. The problem is to find additional questions which, when asked of innocent persons, would lead to responses equivalent to those obtained from questions related to the crime under investigation. The development of questions that will have a differential impact only on the individual possessing what Lykken (1959) calls "guilty knowledge" constitutes the major effort on the part of the interrogator employing this technique. His task is made considerably more difficult, as Lee (1953) points out, by the fact that the suspect has usually been questioned extensively prior to the test regarding the details of the crime and, further, that relevant details are often known to both innocent and guilty alike through news media. The situation in the laboratory, however, is more easily controlled. If a subject is asked to choose a card, the alternative choices that he did not make provide ready-made questions. It is easy to lose sight of the major differences between such a laboratory paradigm and the field situation.

When the subjects are asked to take a card, and the names of these cards are then presented to the individual, all the subjects are known to be guilty and the experimenter wishes to know the specific nature of the information about which they are guilty. This situation has been termed the "guilty information paradigm" (Gustafson & Orne, 1964). On the other hand, the usual field situation is most typically one in which the examiner and the suspect know the nature of the critical questions and the intent of the procedure is to determine whether or not the individual is lying about these questions. This situation has been called the "guilty person paradigm" (Gustafson & Orne, 1964); the task of the experimenter is to differentiate the guilty person(s) from those who are innocent. An analogous distinction is made by Ben Shakhar, Lieblich, and Kugelmass (1970) in a discussion of the altered criteria of detection necessary in applying a signal detection model to the detection of deception situation.

The task that a subject in the laboratory faces is very different for one paradigm as opposed to the other. In one instance he sees his task as concealing specific information that he is known to have; in the other instance he sees his task as one of convincing the interrogator that he does not have any special information at all. The paradigm employed will determine to a large extent the kind of strategy subjects use to avoid detection. In a study of possible countermeasures to avoid detection, Kubis (1962) indicates that it is easier for subjects to produce willfully augmented autonomic responses to irrelevant questions than to suppress their responses to the critical questions. The typical laboratory study using the guilty information paradigm invites the use of this countermeasure. Under the guilty person paradigm, however, such attempts would lead an operator to suspect deception. Moreover, when a polygraph examination is carried out by an interrogator in a real life situation, the effectiveness of this strategy is even more severely limited because the suspect is asked about the

reason for any undue physiological response and the situation constrains him to explain such a response. Having done so, the question may be rephrased in such a manner as to reduce the possibility of responses occurring for such a reason. It would appear that in the hands of a good interrogator a suspect's attempt purposively to augment his responses to neutral stimuli has distinct limitations as a countermeasure.

It is not necessary for the subject and the experimenter to view the experiment as following the same paradigm. In the laboratory one may create a situation that, when seen from the subject's point of view, has many of the elements of the guilty person paradigm, while retaining the structure of the guilty information paradigm in the manner of stimulus presentation and selection of control questions. Such a mixed paradigm is applicable to both of the commonly used laboratory tasks, the card or number test and the mock crime. In the usual card or number test situation (Alpert, Kurtzberg, & Friedhoff, 1963; Block, 1957; Block et al., 1952; Burtt, 1921; Geldreich, 1941; Kubis, 1962; Kugelmass, 1967; Landis & Wiley, 1926; Langfeld, 1921; Obermann, 1939; Van Buskirk & Marcuse, 1954; Violante & Ross, 1964), all possible cards (including the one that the subject has selected) are presented as stimuli, a procedure which automatically requires that the subject lie concerning the card he actually selected. This situation is clearly one in which the subject and the experimenter both know that the subject has some special knowledge and that the experimenter is attempting to identify the nature of that knowledge. Under these circumstances, if the subject voluntarily produces an augmented physiological response, he successfully interferes with detection. The identical experimental procedure may be transformed into the guilty person paradigm, from the subject's point of view, by explaining that there are blank cards as well as numbered cards in the deck from which he is to draw a card. His task will be to convince the interrogator that he has selected a blank card. If he shows an undue response to any of the cards, regardless of whether he selected it or not, he will convince the interrogator of his guilt. This is much the same situation as is met in real life, where the suspect's task is to convince the interrogator that he is innocent of any crime, rather than that he has committed another crime from that of which he is accused. The subject is thus constrained from responding to neutral stimuli as a countermeasure, in that he sees the task of the experimenter not as that of determining which card was chosen but rather whether or not the card chosen contained any significant information.

Gustafson and Orne (1964) carried out a study comparing the successful detection of information under two conditions, one in which the subject saw the experiment as attempting to detect guilty information and the other in which he saw the experiment as attempting to detect whether he had information or not. Subjects operating under the guilty person paradigm were significantly easier to detect, overall, than were subjects operating under the guilty information paradigm. In addition, the way in which the subject perceived his task interacted with the manner in which the stimuli (cards) were presented in the interrogation. Clearly, it is important to consider the subject's perception of his task as it relates to the type of information which he believes the experimenter seeks to uncover.

Next to the rather simple card selection procedure, the most frequently used experimental model is one in which the subject observes or participates in a mock crime and is subsequently interrogated concerning this crime (Baesen, Chung, & Yang, 1949; Berrien, 1942; Berrien & Huntington, 1943; Burtt, 1936; Chappell, 1929; Davidson, 1968; Kubis, 1962; Landis & Wiley, 1926; Lykken, 1959; Marston, 1917; Obermann, 1939; Runkel, 1936). This experimental procedure can also be presented to the subject as two different paradigms. In the guilty information paradigm the subject can be told that several crimes are possible and that the interrogator will try to find out which crime he committed. In the guilty person paradigm, the subject can be told that the interrogator will try to discover whether or not he has committed the crime. Most of the mock crime situations involve the use of the guilty person paradigm. Some, however (Baesen, Chung, & Yang, 1949; Burtt, 1936; Davidson, 1968; Kubis, 1962; Lykken, 1959), provide situations where several crimes or several roles in a crime are involved. In such situations it is possible for the subject to see

his task as either to appear innocent or to avoid revealing his role in the crime. In the Baesen, Chung, and Yang (1949) study, pairs of subjects committed the mock crime; one of the subjects actually carried it out and the other observed. The subjects were told that the purpose of the experiment was to find out which of them had carried out the crime and which had observed. No subject was innocent of the crime. In contrast, Lykken (1959) had some of his subjects commit two crimes, some only one, and some committed no crime. The subjects were told that they were to be questioned about the two crimes, but no report was given concerning their perceived task in the situation. Burtt (1936) required his subjects to look into one of two boxes containing several miscellaneous articles. The investigators then attempted to identify the box into which the subject had looked, clearly a guilty information paradigm. Davidson (1968) ran four groups of subjects, one actually committing a crime, one attempting the crime but failing, one planning the crime but not attempting it, and one group of naive subjects. The subjects were told that they could keep the proceeds of the crime if they could successfully avoid detection. Kubis (1962) created three roles: thief, lookout, and innocent suspect. The subjects who were assigned to the thief and lookout roles were told to appear completely innocent when questioned.

Apart from the obvious necessity of being aware of the paradigm under which these studies were run, it is also important to examine the degree of stimulus control present in each situation. As Lykken (1959) indicates, the subject in a mock crime situation cannot always be relied upon to notice all of the details about which he is questioned. Furthermore, certain aspects of the crime may have a greater impact on the subject than others. Orne and Thackray (1967) have developed an experimental situation that allows for a high degree of stimulus control and yet is flexible in terms of the paradigm. The subjects are asked to play the role of a courier with secret information in the form of code words. The words are thoroughly learned by the subjects and may be assigned without the knowledge of the interrogator. Furthermore, the code words may be words with little meaning to the subject outside of the experimental context. The subjects can be told either to appear innocent of being a courier or to avoid revealing the code words. Orne and Thackray (1967) found that such a model led to high subject motivation and involvement and felt that a realistic interrogation resulted when the subjects played the courier role. The results of experiments using this procedure may be easily considered either in terms of identifying the guilty person or the guilty information.

The lack of uniformity between the various investigations in regard to the paradigm used has made cross comparisons of the results difficult. It is important to consider the paradigm under which the research is conducted, in light of the demonstrated effects of subject motivation and expectancies on detection. It would seem that to render the laboratory situation more like that encountered in the field, the subject should view his task as following the guilty person paradigm. For purposes of statistical treatment of results, however, one can seek to identify both information and guilty subjects.

The Nature of the Stimulus Material

Since the detection of deception depends upon the comparison of significant stimuli with neutral control stimuli, the nature of the critical stimuli used will affect the probability of a physiological response. On one end of a continuum is the selection of a card or number about which the individual is expected to lie. The stimulus has only the affective value given it by the experimental situation. On the other end of the continuum, the individual's actual name or similar pertinent facts about him, his family, or other aspects of his identity possess considerable affective value apart from the laboratory. Using personal material (mother's name, father's name, name of high school) Lykken (1960) was able to obtain 100% accuracy in matching subjects to arrays of stimuli. This high degree of success was probably a function not only of the nature of the stimuli but also the level of motivation and the limited number of subjects with whom the subject was compared.

Mock crimes have been used to provide stimuli that have affective value because of their association with the totality of an involving context. Baesen, Chung, and Yang (1949), Berrien and Hunt-

ington (1943), Davidson (1968), Ellson et al. (1952), Kubis (1962), Lykken (1959), and Marston (1921) reported rates of detection in studies employing mock crimes ranging from 94% (Lykken, 1959; Marston, 1921) to 50% (Landis & Wiley, 1926). The median rate of detection from these studies is 80%. If we compare this rate with the rates in most studies that have used neutral stimuli such as numbers, letters, or geometric designs (Alpert, Kurtzberg, & Friedhoff, 1963; Block, 1957; Block et al., 1952; Burtt, 1921; Geldreich, 1941; Landis & Wiley, 1926; MacNitt, 1942; Ruckmick, 1938; Van Buskirk & Marcuse, 1954), detection rates range from 40% (Landis & Wiley, 1926) to 83% (Ruckmick, 1938) with a median rate of 73%. While this might appear to be slightly lower, comparisons of this kind have little meaning. In a mock crime situation the subject may be told that a $26 sum was stolen, thereby causing the number 26 to become a meaningful stimulus because of its association with the context. This manipulation is not much different from having a subject select a card, thereby making the stimulus meaningful. Furthermore, as has already been pointed out, differences between studies in experimental paradigms, methods of presentation, physiological response used, etc., make valid comparisons impossible.

A systematic attempt to compare contextual and personal stimuli in the same situation, matching for involvement, was carried out by Thackray and Orne (1968b) using the courier situation. The subjects were told that they would play the role of couriers and would overlearn three critical code words. Having done so, they were told that they would be interrogated by someone who, because of a leak in the courier system, had the first names, last names, and dates of birth of six agents and their respective code words. The interrogator, however, would not know the subject's actual identity nor would he know whether the subject was one of the couriers or one of the subjects whose names he did not have and who were not familiar with any code words. They were told that their task would be to appear innocent; i.e., to appear not to be one of the individuals about whom they would be interrogated, nor were they to recognize any of the code words. Each subject was introduced to the interrogator as subject Number 26. Further, the interrogator was in fact blind as to the identity of the subjects. Using this situation it was possible to compare the rate of detection to first name, last name, and date of birth with the rate to three random words that the subject had overlearned. The mean detection rank for the personal material (1.44) was significantly better ($p < .025$) than for the code words (1.62).

Lieblich (1966, 1969) systematically varied the relevance and frequency of usage of stimuli in an information detection situation. He found striking and consistently ordered differences in detection between conditions using the subject's own name and conditions using either an irrelevant name or one that is rare. Detection was greatest when the subject's own name was compared to alternative names known not to be related to the subject. Lower rates of detection were found when the subject's name was compared with names from within his family circle, and still lower rates when an irrelevant or rare name given to the subject was compared with names from within his family circle.

These findings support the common-sense assumption that subjects should be more responsive to personally relevant stimuli reinforced by the context than to previously neutral stimuli made relevant only within the experimental context. Even before any experimental manipulation, the subject's own name or date of birth should evoke a physiological response. This component is probably additive to that component engendered by the experimental situation.

In the field setting, one deals with stimuli that tend to be of great concern to the individual, and which have usually been associated in the individual's mind with their involving context many times. Such stimuli are not briefly associated with the context, as in an experiment, nor are they typically as enduring a part of an individual as is his own name. There are no systematic studies relating the ease with which differential physiological responses may be elicited under varying degrees of association between a stimulus and the context within which it became meaningful. It would be of great interest to know the effects of time on such an association, and the effects of repeated interrogation. Probably some of the increase in detection rate with the courier situation used by Thackray and

Orne (1967), when compared to the usual card selection situations (84% versus 73%) results from the procedure of requiring the subjects to overlearn the stimulus words. Even the spontaneous rehearsal of such connections may ease the task of detection. Such rehearsal may form the basis for the suggestion made by Reid and Inbau (1966) that, after each question session, the examiner leave the room for a few minutes to allow "a lying subject . . . [to] . . . develop greater concern with respect to whatever lies he may be contemplating . . . [p. 28]." In the laboratory context the results of such incubation are probably much more closely approximated by the subject's own name or personal material than by a card, number, or other similar stimuli.

For the most part, laboratory studies have not begun to concern themselves with the nature of the stimuli used in the detection of deception and their effect on the rates of detection. Several studies (Jones & Wechsler, 1928; Smith, 1922; Syz, 1926) have explored differential responsivity in other contexts, but laboratory studies within the detection of deception framework are rare. It would seem that, in light of the central role played by the stimulus material in detection, such studies are in order.

Methods of Stimulus Presentation

Most laboratory research has utilized what has been called the "relevant-irrelevant" method of stimulus presentation (Inbau & Reid, 1953; Lee, 1953), where critical and neutral stimuli are presented to the subject either in a completely random order or in some other sequence unknown to the subject. Such a procedure has many obvious design advantages, including the facilitation of counterbalancing and the equating of stimuli.

In field situations, on the other hand, the tendency has been to use questions that the suspect knows in advance; both the nature of the questions and the order in which they are presented are familiar to him. Such techniques arise from the use of the pretest interview and are partly the consequence of having to develop appropriate control questions. They also permit the interrogator to discuss the meaning of the questions in such a manner as to minimize misunderstandings.

Each of the procedures has certain advantages. In the case of the relevant-irrelevant method, it is difficult for the individual to prepare himself in advance, since he does not know what question to expect. The element of surprise plays a role in all of his answers. On the other hand, the overall level of responsivity remains very high, since the subject does not know exactly what to expect next. In a situation of high motivation and concern, the response to the relevant question may be augmented, but even the irrelevant questions will, because of the manner in which they are presented, evoke considerable physiological response.

A procedure in which a suspect knows what to expect, especially when the questions are discussed in great detail, has the advantage that little or no response should be evoked by the neutral control questions. Any undue response, even to neutral questions, can therefore become a meaningful indication of possible deception. The overall level of responsivity can be greatly reduced and, while this would also affect the responsivity to the critical items, the remaining response to these items would tend to be far more conspicuous in relation to the control questions once the surprise element is eliminated. Such a procedure, on the other hand, permits the suspect to prepare himself for the critical items and, to the extent that he is able to suppress a response, might make detection more difficult. In the most characteristic form of interrogation of this kind, the peak-of-tension technique, the interrogator not only compares the relative response to the critical item but takes advantage of the suspect's tendency to relax once it has passed, looking for (as the name implies) a peaking of tension at the time of the critical item.

Marcuse and Bitterman (1946), discussing the peak-of-tension technique, feel that experimenter biases (voice inflections, subtle mannerisms, etc.) may unduly influence the course of an examination. The same sources of error are, however, inherent in the relevant-irrelevant method as well. In the laboratory these can be controlled by making certain that the person conducting the examination is unaware of the identity of the critical items; in the field no such ready solution is available.

Any comparison between stimulus methods of presentation must be carried out under comparable conditions. Gustafson and Orne (1964) compared

the two procedures by asking subjects to select a numbered card. Numbers were then presented either in a random fashion, following the relevant-irrelevant procedure, or in ascending and descending order, following the peak-of-tension procedure. Each of these methods of stimulus presentation was studied under both the guilty person and the guilty information paradigms. When the guilty information paradigm was used, the relevant-irrelevant method was significantly more effective than the peak-of-tension technique; when the guilty person paradigm was employed, however, both techniques became more effective and any advantage of the relevant-irrelevant method was obviated. The peak-of-tension method appeared particularly vulnerable to the creation of false-positive responses in the laboratory context. Such responses, however, would not be a very effective stratagem in the real life situation and, when the laboratory design restrains subjects from their use, the findings appear more in line with the reported experience of professional interrogators that the two techniques are similar (Reid & Inbau, 1966).

The Effect of Habituation

As will be discussed later, the probability of detection is raised by increasing the number of trials available comparing different significant stimuli to neutral controls. One simple way in which such an increase may be augmented is to repeat the same stimuli. To the extent that one is dealing with random responses, a repetition will tend to clarify which stimuli evoke a differentially greater response. Habituation, however, may diminish the differential responsivity. The crucial question, then, concerns the relative rates of habituation between significant and control stimuli. If the critical stimuli habituate more rapidly than do control stimuli, little will be gained by extensive repetition of the same stimuli.

A study reported by Ellson et al. (1952) compared 10 subjects who were administered two series of five trials, each consisting of the names of six months, one of which the subject had previously selected. The average number of successful detections was 80% for the first series and 70% for the second series. Although somewhat inconclusive due to the small *N*, this finding suggests greater habituation to the critical stimuli and is similar to a finding of Gustafson and Orne who, in an unpublished study, repeated a simple card test five times, motivating the subjects as described earlier. It was observed that combining the first and second repetition yielded a somewhat increased accuracy of detection over the first alone but that adding the third repetition did not augment detection. The addition, in turn, of the fourth and fifth repetitions actually decreased accuracy, indicating that in that situation at least, detection was not facilitated by habituation.

The relationship of habituation to detection, however, is by no means simple. As mentioned earlier, Thackray and Orne (1967) observed that a differential treatment effect became clear only at the end of a long series of stimuli. This study was characterized by a great deal of responsivity to neutral stimuli, which seemed to attenuate more rapidly under those circumstances than the responsivity to the significant stimuli. The effect of habituation on differential responsivity may be a function of the involvement of the individual. Peterson and Jung (1907) report the results of three successive trials on a word association test, during which the skin potential response (SPR) was monitored. During the first trial a number of stimuli elicited responses, one of which was to a stimulus with which the subject was emotionally involved. On the second trial the response to this stimulus was the largest and only a few other stimuli evoked significant responses. On the third trial, the same stimulus led to an only slightly attenuated response, while the other stimuli now produced very little response. Jones and Wechsler (1928), again using the word association technique, found differential habituation even within one trial. When a list of mixed emotional and neutral words was given, the responses to the neutral words became less for words at the end of the list when compared to the same words when placed at the front of the list, while emotion-provoking words showed no such position effect. These results, different from those of the Ellson et al. (1952) and the unpublished Gustafson and Orne studies, both obtained with card selection tests, raise the possibility that successive trials may serve to accentuate the signal-to-noise ratio when more involving stimuli are utilized.

If it is possible to habituate a subject to the neutral stimuli while minimizing or preventing habituation to the critical stimulus, then detection should be dramatically improved. Geldreich (1941) demonstrated this process. The subjects in one group were asked to choose a card from a set of five and then were administered a single series of questions concerning which card they had drawn. Using the GSR, he correctly identified the chosen card for 74% of the subjects. The other group was also required to select a card, following which they were administered from 20 to 50 cards, none of which were in the original set of five, until virtually no GSR was elicited. Then the original set of five cards was presented. Under these conditions, the subjects differentially habituated to the noncritical stimuli and essentially failed to habituate to the critical stimulus. As one would predict, the GSRs to the noncritical stimuli in the final set were substantially less than GSRs to comparable noncritical stimuli in the group without habituation. The average response to the critical stimulus, however, was essentially the same in both groups. As a result, the correct card was identified for 100% of the subjects in the second group.

The studies mentioned so far in this section have used the GSR as a measure of responsivity. The detection of deception in the field, however, typically employs the heart rate, "relative blood pressure," and respiration changes in addition to, or in place of, the GSR. Differential habituation is likely to vary with the parameter being examined. In an unpublished study, Solomon et al. (1958), focusing on the conditioning of the heart rate in humans to highly dramatic stimuli, observed that the heart rate and respiratory changes were difficult to condition and extinguished very rapidly, whereas differential GSRs persisted over a long period of time. J. P. Seward and G. H. Seward (1934) supported these observations in a study tracing the course of habituation to shock stimuli. They found that, within the same session, body movement and respiration responses to the shock diminished more quickly than did the GSR.

It seems likely that differential responsivity on parameters such as the heart rate or blood pressure would demand a very high level of arousal in the subject, perhaps sufficiently great to interfere with the easy recognition of a differential GSR responsivity. A lower level of arousal, on the other hand, might facilitate the recognition of differential GSR responsivity, while even lower levels of arousal again reduce differential responsivity. Darrow (1936) felt that adrenin (natural secretion of which adrenalin is an analog) inhibited the GSR and that blood pressure might therefore be a better measure at high levels of activation. Systematic work on the differential responsivity of measures with differing levels of activation is lacking.

The Role of Verbal Response

Although a few studies have not required a verbal response (Gustafson & Orne, 1963; Lieblich, 1966; Lykken, 1959), most studies require subjects to respond "Yes" or "No" to the questions. The procedure is usually arranged such that the subject will be forced to lie concerning the critical item. The extent to which verbal lying influences detection rates has been investigated in several studies (Ellson et al., 1952; Gustafson & Orne, 1965b; Kugelmass, Lieblich, & Bergman, 1967; Lieblich, 1966), all employing the GSR as the physiological measure. The conclusions to be reached from examining these studies are, at best, equivocal. Part of the confusion arises out of the diversity of procedures among the studies. Some studies have compared saying "Yes" to each question with saying "No" to each question (Ellson et al., 1952; Kugelmass et al., 1967). Others have compared saying "No" to remaining mute (Gustafson & Orne, 1965b; Lieblich, 1966). Gustafson and Orne (1965b) have also compared these two latter conditions with a condition in which subjects were required to respond with the first word that came to mind in a free association procedure.

The results are as varied as the procedures. Ellson et al. (1952) found in their pilot study that four of their eight subjects were detected when required to say "No" to each question, while only two of the eight (chance) were detected when replying in the affirmative. No assessment of significance was possible because of the small N and the use of the subjects as their own controls. Kugelmass, Lieblich, and Bergman (1967) replicated these conditions and compared trials in which individuals were required to say "No" to all questions with

trials in which they were required to say "Yes" to all questions, counterbalancing for order. Under both conditions, the subjects were detected at a level well above chance, and no significant difference was found between conditions.

Gustafson and Orne (1965b), in a study comparing three groups of separate individuals, in which all subjects were motivated to deceive the experimenter, found that both those subjects who responded with "No" and those remaining silent were detected at a level significantly above chance, with the "No" group exhibiting the higher detection rate. The subjects in the free association group, however, were not detected better than chance. Lieblich (1966) ran two conditions out of six, in which his subjects were requested to remain mute. Although the material used in these two conditions was rather neutral, detection in the mute conditions was reduced from that in similar conditions in which the subjects were required to lie.

Clearly, the differentially augmented physiological response that forms the basis for the detection of deception is not contingent upon the subject's actual lying. It can occur in the absence of any verbal response and may also occur when subjects tell the truth to critical stimuli and lie to irrelevant ones (Kugelmass et al., 1967; Reid & Inbau, 1966). It is tempting to explain these discrepancies by indicating that it is the deceptive intent, rather than an overt lie, that is responsible for the increased physiological response. There appear, however, to be at least two other components in the detection of deception situation that are often confounded with the effect of lying or deception. The first of these components is that the subject is sensitized to an essentially neutral stimulus by the mere fact of drawing attention to it as the selected stimulus. This effect is in contrast to that seen when a stimulus has inherent arousal value, which has been discussed earlier. The sensitization effect is a situation-specific arousal inherent in the process of selecting any given stimulus as critical in the set of stimuli. The selected material becomes the figure in a figure-ground relationship among stimuli, with the remaining stimuli constituting the ground.

Only when the stimuli are all intrinsically neutral, and both lying and deceptive intent are eliminated, does the effect of sensitization become self-evident. If a subject is asked to select a numbered card from among several, to place it in full view of the experimenter, and then to respond honestly when asked by a tape recording about several numbers, the mere selection of a particular number will result in some increase in the GSR to the chosen number. In such an experiment, the subject responds "No" to each number except the one he had selected, and it could be argued that the augmented physiological response is a function of the different verbal response rather than of the sensitization to a particular number. Similar findings are obtained, however, if the same experimental procedure is followed, the chosen number exposed in full view, and the subject then asked to say "No" to each number in a context where his "lie" could not conceivably have deceptive intent. This type of sensitization to a selected number is present in all card test situations, and is generally confounded with the consequences of attempting to deceive. It is an effect which becomes obvious only in the kind of situation described above, where the stimuli are truly neutral and matched, the situation simple, and the time interval between card selection and the presentation of the stimuli is kept very brief to prevent the effect from being swamped by other factors.

The same kind of an experimental procedure can be easily altered to demonstrate the effect of trying to deceive. Merely instructing the subject not to show the card to the experimenter and to try his best to conceal its identity in his physiological responses—adding perhaps that this is difficult but some intelligent subjects are able to do so—leads to a significantly greater physiological response to the selected card. The sensitization effects, the effects of the intrinsic arousal value of the stimuli, and the motivation to deceive, as well as the consequences of detection, all appear to be independent and additive in the degree they augment the differential physiological response.

The second component is the amount of attention the subject pays to the entire set of stimuli. While this effect is partly determined by the motivational factors discussed earlier, instructing the subject to respond "No" (or "Yes") identically to each stimulus allows a strategy of ignoring the

saliency of the selected stimulus. (This is why in a field context questions are phrased to require both yes and no answers in order to assert innocence.)

The effect of whether or not the subjects pay attention to the stimuli was noted in the Gustafson and Orne study (1965b). Postexperimental inquiries with subjects revealed that, when the individual had the task of providing free associations, it was possible for the subject to decide in advance on a number of associates which he then used as responses in a mechanical fashion; this strategy actually helped the subjects to ignore the content of the stimuli. Subjects reported that they found it easier to ignore the stimuli when carrying out this task than when they were required either to say "No" to every stimulus or to attend without giving any verbal response.

It may also be possible, however, for subjects who are required to say "No" to each stimulus to do so in a completely mechanical fashion, responding with "No" to the sound rather than to the actual word. Instances have been observed, for example, where subjects answered "No" when instructed that the test was completed, or when they heard some extraneous noise. No such response is observed with subjects who are differentially verbalizing, since it is essential for these subjects to listen to the stimuli as they are presented in order to respond correctly.

The additional factors that seem to play a major role in laboratory situations appear less relevant in the field situation because of the profound consequences of the interrogation. Furthermore, questions in the field situation are frequently arranged so that both "Yes" and "No" answers may be required, depending on the way in which the question is asked. Such a procedure forces attention to the questions asked so as not to answer incorrectly. Even during procedures in which all answers may be the same, the suspect is so deeply involved in the situation that he is likely to attend to every cue and stimulus present in order to avoid making a mistake. In the laboratory the role of lying and the response required of the subject is, as yet, an unsettled question. Studies must separate the factors of involvement and attention from those concerning the response. It appears that, in the laboratory, either a "Yes" or a "No" response facilitates detection over an unrelated response or no response. Detection is possible, however, at a level significantly better than chance without any verbal response, provided that the subject is motivated to deceive and the stimuli have sufficient impact. The clarification of the specific effect of the verbal response on the likelihood of detection remains a task for future research.

Response Variables

To evaluate the state of the subject with respect to the stimuli presented him, one must have some measure of his emotional response. By far the most frequently used measures are those several correlates of autonomic nervous system activity which are subject to rapid change and a rapid return to baseline. Some investigators have used motor activity of the hand, eye movements, or verbal responses, measures usually considered to be more nearly under voluntary control. Such experiments rely on the psychological effect of the stimuli to produce abnormalities in these more usual modes of response. In view of the reliance placed on autonomic measures in the field, these will be discussed first.

Measures of autonomic activity While studies have demonstrated differences between individual patterns of autonomic activity (Lacey & Lacey, 1958; Schnore, 1959; Wenger, Clemens, Coleman, Cullen, & Engel, 1961) and differences between various emotional states and the patterns produced (Ax, 1953; Sternbach, 1960), there is no evidence at the present time that the autonomic changes which accompany deception differ qualitatively from those produced in other emotional states involving sympathetic nervous system activation. In general investigators feel that deception responses most closely resemble those characteristic of emotional excitement (Chappell, 1929) or fear (Marston, 1917), although even simple, auditory stimuli have been shown to produce autonomic patterns which are essentially the same as those occurring during deception (Davis, Buchwald, & Frankmann, 1955). A great deal of the research that has been done on the psychophysiological correlates of emotion is relevant to the detection of deception problem, but

a discussion of most of this work is beyond the scope of this section. (See Arnold, 1960; Woodworth & Schlosberg, 1954.)

Most studies in the detection of deception use the detection rate as the validating criterion for judging the usefulness of the measures employed. As the preceding sections of this chapter tried to make clear, however, both subject and task variables are significant determinants of detection rates. Since few studies have concerned themselves exclusively with response variables per se, the effectiveness of any given physiological or behavioral measure of deception is generally confounded with these other experimental manipulations. Only when several response variables are included in a single study is it possible to draw meaningful conclusions concerning their relative effectiveness. To the extent possible, emphasis will be given to those studies which provide a comparison of more than one response variable within a single design.[3]

Cardiovascular measures Commercial "lie detectors" have used a measure often referred to as "relative blood pressure," obtained by inflating an arm or wrist cuff to a point approximately halfway between systolic and diastolic pressure. Davis (1961) has pointed out that this technique can be both painful and dangerous, unless frequently interrupted, and is not a true measure of either systolic or diastolic pressure. Perhaps for this reason, attempts are currently underway among field experts to change from the term "relative-blood-pressure" tracing to the term "cardio" tracing. This change reflects the growing awareness that this tracing does not really reflect changes in blood pressure but volumetric changes in the arm and heart rate. It is important that cardio measures and true measures of systolic pressure not be confused, since the two are quite different. Most laboratory studies and several early field studies have used systolic blood pressure rather than the cardio tracings, taking measurements intermittently during the course of questioning (Chappell, 1929; Landis & Gullette, 1925; Landis & Wiley, 1926; Langfeld, 1921; Marston, 1917). A frequent response is a rise in pressure that is greater during deception than when the subjects are telling the truth. As expected, because of individual differences in reactivity and differences in procedure, the magnitude of the mean difference varies across the studies. Using systolic blood pressure alone, Chappell (1929) obtained 87% correct discrimination between subjects telling the truth or lying concerning details of a mock crime. Marston (1921), also using a mock crime, obtained 94% accuracy in differentiating between liars and those choosing to tell the truth. Recent investigators have not reported results as outstanding as these. Ellson et al. (1952) found systolic blood pressure measures about equal to respiration measures, and far inferior to the GSR. Thackray and Orne (1968a) found no evidence of discrimination with a measure of systolic blood pressure.

A reason for the differences may stem from the temporal relationships between the stimuli and measures of systolic blood pressure. The time necessary for a maximal rise in systolic pressure following a stimulus has not been well established, although Rushmer (1961) notes that rises in blood pressure are rapidly modulated through the baroreceptor reflex. The ability of a procedure, such as systolic pressure monitoring, to detect deception may well depend largely upon the time at which the pressure is measured. Both Ellson et al. (1952) and Thackray and Orne (1967) used devices to measure systolic pressure automatically at relatively fixed intervals. When the lack of success with the measure in these two studies is contrasted with the success reported by Chappell (1929) and Marston (1917), it seems possible that the manual determination of blood pressure is effective because it time-locks the measure in a fixed relationship to the stimuli, whereas an automatic system introduces a variable time interval between the stimulus and the point of measurement.

In the past few years a number of measures have been investigated for the purpose of augmenting or replacing blood pressure as a measure of cardiovascular changes during deception. Perhaps the most common technique is digital plethysmography. Brown (1967) has covered this measure in detail and states that "the plethysmogram is an extremely sensitive measure of internally and ex-

[3]Even when a hierarchy has been established within a single study, however, there is no assurance that the relationships will remain invariant with other levels of activation.

ternally induced changes, surpassing even the electrical skin phenomena in this respect [p. 55]." The experience of investigators in the area of the laboratory detection of deception does not, however, show the measure to be as useful as GSR.

Although the heart rate is easily derived from either the electrocardiogram (EKG) or from records of finger or pulse volume and is a commonly used measure in psychophysiology, it has received little attention in laboratory studies of deception. Changes in the heart rate are difficult to see unless special circuitry is employed to convert the interpulse time into a measure of rate.

None of these cardiovascular measures appears to discriminate well between guilty and innocent individuals in the laboratory setting, as indicated in the few studies comparing these measures with others, notably with the GSR. Kubis (1962) reported pulse volume to be slightly superior to respiration in supplying cues to examiners attempting to differentiate guilt from innocence. Violante and Ross (1964), on the other hand, found respiration to be superior to pulse volume and found little or no discrimination with finger volume. In a study comparing several measures of autonomic activity during deception, Thackray and Orne (1968a) observed that finger volume discriminated between innocent and guilty subjects at a better than chance level, while pulse volume did not. In all of these studies the GSR was the best discriminator. While Kugelmass and Lieblich (1966) and Kugelmass, Lieblich, Ben-Ishai, Opatowski, and Kaplan (1968) found the heart rate to discriminate no better than chance, Ellson et al. (1952) indicated that heart rate was slightly superior to pulse volume but inferior to the GSR and systolic pressure. Even pulse volume was found to discriminate at a level better than chance. They indicated that the heart rate response consisted of an initial acceleration, followed by deceleration, with the magnitude of the deceleration becoming greater during lying than during truth. Maximum discrimination with the plethysmographic technique occurred when they measured the rate at which subjects recovered from increased peripheral resistance during the 12–22 sec poststimulus period, with non-lie responses recovering more rapidly than lie responses. This measure was employed after discovering that equal vasoconstriction responses were evident to both critical and noncritical stimuli. They suggested that a maximal response may have occurred in both cases. In the light of these data, Brown's (1967) statement that the plethysmogram is highly sensitive to change may indicate that the measure is too sensitive to yield a differential response in the detection of deception. The lack of agreement across studies concerning the usefulness of these measures suggests that greater effort should be directed toward an understanding of cardiovascular changes during deception.

Psychological changes in the subject are reflected both in changes in the cardiac output and in the amount of peripheral resistance. Blood pressure itself is the end product of the complex interplay of heart rate, stroke volume, and vasomotor influences. An increase in the heart rate alone, unaccompanied by other circulatory changes, affects diastolic blood pressure but has relatively little effect on systolic pressure. On the other hand, an increase in the volume of blood pumped per beat will affect primarily the systolic blood pressure, consequently increasing pulse pressure. An increase in peripheral resistance results in an increase in the mean blood pressure, but the more intense effect is on diastolic pressure, due to the longer period of the diastole relative to the systole (Best & Taylor, 1950). The primary cause of increased cardiac output may be an increase in stroke volume, rather than in the heart rate (Rushmer, 1961). The "cardio" measure, used with success in the field situation, is largely a plethysmographic measure. The record reflects complex interactions between the blood pressure and volumetric changes in the arm (Woodworth & Schlosberg, 1954). Reid and Inbau (1966) indicate that the usual criterion for deception consists of a rise in the baseline of the tracing; a decrease in pulse amplitude may or may not be present. Changes in the baseline level of the tracing are likely to reflect an increase in blood flow, which in turn may be accompanied by various different kinds of blood pressure changes. During emotionally mediated activation of the sympathetic nervous system, vasoconstriction takes place in the skin and in the splanchnic viscera, while vasodilation occurs in the skeletal muscles (Brod, 1964). At least part of the increase in cuff pressure observed during

deception in the field situation is probably a result of the increase in volume produced by the increased blood flow to the muscles that make up the bulk of the upper arm tissue and greatly outweigh any reduction in blood flow to the skin of the upper arm (Brod, Hejl, & Ulrych, 1963). Ansley (1959) gave some support to this contention. He compared records taken with the standard arm cuff to those taken with a wrist cuff; in most cases the wrist cuff records showed markedly reduced responses, although the majority of records could be readily scored for deception. Placing the cuff over the musculature of the upper arm rather than the forearm may increase responsivity, since about 85% of the tissue in this area is skeletal muscle (Barron & Ruch, 1960). If some measure of the relative concentrations of blood in the viscera and skeletal musculature were available, it might serve as a sensitive measure of deception. The measurement of visceral vasoconstriction, however, would seem difficult at best.

A few other measures of cardiovascular activity have been suggested for use in the detection of deception, among which are pulse velocity (Dana & Barnett, 1957; Ellson et al., 1952, J. G. L. Williams & B. Williams, 1965) and blood flow. Reid and Inbau (1966) suggest the use of blood flow on the basis of preliminary investigations using an infrared sensor placed on the neck over the carotid artery. Their evidence indicates that the measure is differentially sensitive to stimuli during a card test and suggests that a Doppler shift measurement of blood flow in the arm might prove useful as well.

Respiratory measures Measures of respiration were among the first to be used in the detection of deception (Trovillo, 1939). With the exception of the early work of Benussi (1914), virtually no studies of deception have used respiration measures as a sole physiological index, perhaps because of the difficulty involved in an attempt to quantify the respiratory pattern. Although the practice among field examiners is to regard any marked change in respiratory patterns following critical questions as indicative of deception (Joseph, 1957; Reid & Inbau, 1966; Trovillo, 1942), laboratory studies have usually employed either Benussi's inspiration-expiration (*I*/*E*) ratio (Burtt, 1921; Landis & Gullette, 1925; Landis & Wiley, 1926) or more simple measures of average respiration amplitude and breathing cycle time (Ellson et al., 1952). There seems to be an increase in the ratio of the time of inspiration to the time of expiration (*I*/*E* ratio) following deception. This increase is closely related to the increase in breathing cycle time found by Ellson et al. following deception. These latter investigators also found breathing amplitude to be reduced during deception, when compared to nondeception responses. Some of the difficulties in quantifying respiration may be the result of difficulties in obtaining the *I*/*E* ratio. Ellson et al. (1952) reported that they attempted to determine the ratio from several records and found that no clear delineation existed between periods of inspiration, expiration, and rest. The lack of a distinctive point of change, they feel, can easily lead to large random variations in the ratio.

Apart from the measurement of respiratory parameters by means of a sensor stretched around the thoracic or abdominal region, very little work has been done on monitoring respiration within the area of deception detection. Reid and Inbau (1966) report the use of Doppler techniques to obtain the usual respiration tracing without sensor contact. Ellson et al. (1952) employed a thermocouple placed so as to measure the temperature of the subject's breath as he inhaled and exhaled. They found that baseline changes in breath temperature occurred but they were not significantly related to the stimuli. Measures of tidal volume or gaseous saturations in the breath, which require the subject to breathe through a mouthpiece, would seem to be impractical in the detection of deception situation. Impedance pneumography, however, may have potential as an alternative technique (Stein & Luparello, 1967).

Galvanic skin response The galvanic skin response has long been recognized to be one of the most sensitive indicators of autonomic activity.[4] (See Edelberg, 1967, and Chapter 9 of this book for techniques and theory.) Its use in the detection of deception has had an interesting and controversial history. Many persons with field experience claim

[4]Because the results with other measures of the electrodermal response, such as the SPR, have thus far closely paralleled those obtained with the GSR in detection of deception situations (Thackray & Orne, 1968a), only the GSR will be discussed.

the GSR to be useful in the laboratory but of much less value than respiration and blood pressure in criminal investigations (Larson, 1932, Lee, 1953, Marston, 1938, Reid & Inbau, 1966). They appear to reflect the belief that the GSR is too responsive to any stimulus, making unequivocal decisions difficult in real life situations. Others, however, have supported the use of the GSR in the field. Kugelmass et al. (1968) found both relative blood pressure and the GSR about equal in detecting card choices with criminal suspects. Summers (1939) strongly supported the use of the GSR in both laboratory and field applications, and reported detection rates of over 98% with this measure alone. Likewise, MacNitt (1942) also supported the GSR and reported detection rates of equal magnitudes in both laboratory and field situations.

Interestingly enough, most of the laboratory studies that have compared GSR with one or more additional variables agree that the GSR is superior to other variables in the detection of deception. Ellson et al. (1952), for example, found it far superior to all of the other variables they investigated, as did Thackray and Orne (1968a). Likewise, Kubis (1962) reported GSR to be considerably better than either pulse volume or respiration, while Violante and Ross (1964), using measures similar to those of Kubis, also found GSR to discriminate better than other measures. Kugelmass and Lieblich (1966) obtained significant discrimination with GSR but not with pulse rate.

All of these studies tried to create highly motivating or involving situations for the subjects, in an attempt to approximate the real life situation. Ellson et al. (1952) and Kubis (1962) employed mock crimes, while Violante and Ross (1964) used aversive stimuli (noise) in a conditioning paradigm. Kugelmass and Lieblich (1966) specifically tried to create a highly stressful situation by employing policemen as subjects and informing them, as one of the experimental conditions, that their future occupational advancement might depend upon their success in controlling emotions in the polygraph test. Despite the variety of conditions and stresses, all found the GSR to be highly effective.

It is, of course, possible that the highly emotional circumstances of actual examining conditions in a criminal case were not even approached in these studies, and thus they offer no real argument against the contentions of field authorities. The problems of simulating real life situations are too well known to require elaboration. A lack of involvement on the part of the subjects in all of the studies, however, particularly the Kugelmass and Lieblich (1966) study, is difficult to believe.

It has been argued that the equipment employed for measuring GSR in the field is inadequate, accounting for the lack of success with this measure (Ellson et al., 1952; Higley, 1958). In an unpublished study conducted by Gustafson, GSR detection rates based upon measures obtained from a Stoelting Deceptograph (an instrument typical of those used in the field) were compared to those obtained using a Beckman Dynograph with a constant current bridge and zinc-zinc sulphate electrodes. No difference in detection rates was found. While the equipment employed by field examiners to measure GSR may leave much to be desired in terms of current psychophysiological practice, it is doubtful that its inadequacies are the sole explanation for the convictions held by field personnel regarding the effectiveness of the GSR in guilt detection.

The relative effectiveness of GSR in both laboratory and field situations remains to be evaluated. No simple explanation such as equipment insufficiencies or level of arousal can fully account for the discrepancies. It is clear, however, that in laboratory settings, particularly with low subject involvement, GSR has been the most effective discriminator. It is also true that GSR is difficult to interpret with extremely anxious subjects; and under these circumstances respiration and the cardio tracings remain easily interpreted by inspection. The tendency to discount the GSR in the field situation is probably also related to the fact that some individuals are very unresponsive on this variable. Whether this lack of GSR responsivity is situational or a matter of autonomic specificity has not been investigated in this context. Despite all this, some individuals with extensive field experience are convinced that GSR is the most useful index of deception. In the absence of definitive data, the possibility that reports concerning the effectiveness of the GSR as a discriminator in field situations are related in large part to operator preference and response specificity cannot be excluded.

Oxygen saturation A measure of the oxygen saturation in the blood can easily be obtained by means of a photoelectric sensor attached to the pinna of the ear or placed on the neck (Dana, 1958; Dana & Barnett, 1957). This measure has been shown to reflect emotional changes (Lovett Doust & Schneider, 1955), although changes in oxygen saturation take place at a rate somewhat slower than the rate for other measures (Dana & Barnett, 1957). Thackray and Orne (1968a) compared discrimination with the oxygen saturation measure to discrimination with several other measures; they found the discrimination significantly better than chance for experimental material (code words) but not for personally relevant material. The relatively slow rate of change in this measure, however, probably precludes its use in field situations.

Pupillary response The response of the pupil to changes in autonomic activity in emotional states has been known for some time (Bender, 1933; Löwenstein & Friedman, 1942) and has more recently become the object of considerable research (Hess, 1965; Hess, Seltzer, & Shlien, 1965; Woodmansee, 1966). Berrien and Huntington (1943) compared pupillary responses to a measure of relative blood pressure in a deception situation involving a mock crime. The most typical response consisted of a slow, negatively accelerated dilation, lasting 1–5 sec, followed by a rapid constriction. Although this response also occurred spontaneously following control questions, it was most frequent when deception was involved. A second pupillary indicator of deception consisted of an increase in pupillary fluctuation in guilty subjects when the critical questions were introduced. When scored independently, both pupillary response and blood pressure yielded correct discrimination in over 70% of the cases and, since misidentifications of subjects on one measure were not necessarily the same as those on the other measure, the authors note that the two measures serve to complement each other, in combination yielding about 80% detection. Simultaneous significant changes to critical stimuli in both measures occurred in only 48% of the responses.

The most severe drawback in the use of the pupillary response is the problem of measurement. Photographic recording of the response has long been common (Bender, 1933), sometimes employing infrared lighting and film to avoid illumination differences (Lindsley, 1951); recently, devices have been developed using photocells to scan the eye (Löwenstein, 1956). Such techniques, in addition to the possible use of closed circuit television, should facilitate further research with this interesting and potentially significant measure.

Electroencephalogram A number of investigators have reported a blocking or reduction in the alpha activity of the electroencephalogram (EEG) with stimulation of an emotion-producing sort (Lindsley, 1951; Thiesen, 1943; Williams, 1939). The only known study employing the EEG in the detection of deception was conducted by Obermann (1939), with two separate experiments reported, one involving neutral stimuli (numbered cards) and the other involving knowledge of the details of a fictitious crime. Monopolar recordings from a left occipital placement were obtained with the eyes closed, and judges were asked to rank the records on the basis of their likelihood of being indicative of deception, using as a criterion any disturbance in the record. Although the statistical treatment of the data makes them difficult to interpret in terms of the discrimination achieved, the detection of deception with EEG criteria seems possible. Interestingly enough, more objective measures of amplitude or percentage of alpha activity did not prove as efficient as did the subjective judgment.

Miscellaneous autonomic measures The use of several other measures of autonomic nervous system activity has been suggested, among them salivary secretion, pilomotor response, and gastrointestinal motility. No evidence is available, however, concerning the use of these measures in the detection of deception. It would seem that the understanding and refinement of some of the more usual measures would be of greater value than would the proliferation of a number of esoteric measures, unless a significant improvement in detection can be demonstrated (Orlansky, 1962).

Behavioral measures of deception Although the emphasis in current interrogation seems to focus on physiological measurements that are recorded during the examination period, field operators have long recognized the important information to be

gained from observations of a suspect's actions, manner, and vocal responses (Reid & Arther, 1953; Reid & Inbau, 1966). While aspects of the subject's behavior no doubt add to the interrogator's ability to classify him correctly (Kubis, 1950), a number of studies have specifically investigated overt behavioral measures in the detection of deception situation. A clear separation does not exist between these measures and those covered previously. Respiration, for instance, is under voluntary control, as well as subject to autonomic influences, and several of the measures in the present section are probably influenced, in part, by autonomic activity. Nevertheless, the following behavioral measures have been employed to detect the presence of deceptive responses.

Reaction time The use of associative reaction time to indicate deception was one of the earliest methods employed (Jung, 1907; Jung, 1910; Wertheimer, 1905; Wertheimer & Klein, 1904; Yerkes & Berry, 1909). A review of this early literature has been compiled by Crosland (1929). If a subject is asked to associate freely to a list of words, some critical to a crime and others neutral, it is expected that he will either give himself away through revealing or bizarre responses or, in suppressing such reponses, will give long reaction times and signs of emotion. As Woodworth and Schlosberg (1954) point out, however, it is vital that normative data from known innocent subjects be available, since critical words are typically less common than are the neutral words and will result in long reaction times, due to a lack of associations.

Marston (1920) studied reaction time in a laboratory situation, in which the subjects were instructed to either obey or disobey requests concerning arithmetic operations to be performed on sets of numbers. The time required to answer each item was measured, and it was predicted that response times would be longer when the subject disobeyed the experimenter and tried to deceive him. He found three groups of subjects: those whose responses were longer as predicted, those whose reaction times were inconsistent, and those who gave consistently shorter reaction times. He felt that both those subjects with shorter reaction times and those with longer response times were displaying a typical deception response. Goldstein (1923), however, felt that those subjects with shorter reaction times were simply not involved in the task of deceiving the experimenter. The whole argument raised considerable controversy (English, 1926; Goldstein, 1923; Marston, 1925; Rich, 1926) but, as a general conclusion, whenever considerable affect is generated with deception, reaction times will probably increase.

The use of associative reaction time as an indicator of deception has been both supported and questioned by investigators. In a statistical combination with other indicators, Crosland (1929) found reaction time to be useful in determining the guilt of a person in an actual dormitory theft. Winter (1936) likewise found increased reaction times to critical words in a person guilty of an actual dormitory theft, although several innocent suspects also exhibited increases. Respiratory and blood pressure measures were also used in this instance; blood pressure was found to be the most useful, while respiration records were the least useful. In a study comparing deception responses to a mock crime, Runkel (1936) measured both the reaction time and motor response disturbances and found that for every subject the mean reaction time was greater to critical stimuli than it was to noncritical stimuli. Larson (1922) feels that the reaction time measure is not as satisfactory as is a respiration tracing and gives evidence that reactions occur in the tracings which are not reflected in longer reaction times.

In addition to measuring the reaction time to a word association task, the reaction time in answering questions has been measured. Ellson et al. (1952) instructed subjects to remove a sum of money from a box and then questioned them concerning the amount taken. The subjects responded by pressing a lever to the right for an affirmative answer and to the left for a negative answer. In addition to measuring reaction times, muscle potentials were obtained from the right forearm, since the authors felt that deception would result in motor conflict which would be reflected both in the reaction time and in the electromyogram (EMG). Measures of the reaction time significantly differentiated between truthful and deceptive responses. A measure of EMG amplitude, weighted and combined across five time periods during the stimulus presentation and the response, enabled

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the investigators to discriminate deceptive affirmative responses 90–95% of the time and deceptive negative responses 65–70% of the time.

Interference with voluntary motor behavior Considerable interest was generated in the early 1920s concerning the use of semivoluntary muscular indicators of deception. This interest was primarily engendered by the considerable success in criminal interrogation reported by the Russian psychologist Luria (1932) in recording the voluntary and involuntary movements of both hands in response to word associations. The rationale underlying this technique is that during heightened emotion there is a breakdown in motor control. When, as in Luria's case, the subject is required to press on a rubber bulb with his right hand as he responds verbally and to keep his left hand on another bulb, variations in response patterns and tremors or disturbances of the left hand may be recorded pneumatically. Significant responses usually consisted of tremors in both the right and left hands and rough or partial responses on the part of the right hand. Often a motor response would begin with the termination of the stimulus and fail to be completed, being followed later by a complete motor response and a verbal response. Luria felt that these premature responses indicated that certain words were being suppressed on the part of the subjects. Luria's techniques stimulated considerable research, most of which has been concerned with the nature of disturbance in abnormal subjects. Yates (1961) has summarized much of this literature, coming to the conclusion that increasing degrees of mental disorder are related to increasing levels of both left- and right-hand motor disturbance.

Few studies have specifically applied the technique to the detection of deception. Burtt (1936) found the most diagnostic measure of deception to be the extent to which the motor response in the right hand preceded the verbal response and was able to discriminate correctly in 69% of the cases. The nature of the responses, if any, elicited by the other hand was not reported. Runkel (1936) also found responses in the left hand of little discriminative value, being infrequent. He attributes this lack of distinctive left-hand responses to the relatively weak emotion generated by the experimental procedure. He found distinctive right-hand motor responses to occur to critical stimuli an average of 50% of the time across subjects, the responses consisting of a wavelike tremor preceding the motor response. As Morgan and Ojemann (1942) point out, the determination of significant responses depends to a large extent upon the skill of the investigator.

Voice quality Quite a number of studies have explored the relationship between aspects of vocal expression and the emotional state of the person speaking (Kramer, 1963). Only two known studies have explored the use of vocal measures of deception, one employing subjective judgments of deception, the other an objective amplitude analysis. Using the subjective judgments of persons hearing other persons lie or tell the truth over a public address system, Fay and Middleton (1941) found that the two types of statements could be differentiated correctly about 55% of the time (chance was 50%). Alpert, Kurtzberg, and Friedhoff (1963) employed a deception situation with neutral stimuli and measured the amplitude of the subject's verbal responses with a voltmeter. Both a full frequency band (100–6000 Hz) and a filtered low frequency band (100–250 Hz) were measured. No differences were found in the full frequency band during deception, but amplitude increases in the low frequency band to the critical stimuli were significantly different from those to noncritical stimuli. Such an easily obtained and potentially useful measure should not be ignored.

Eye movements Eye movements and eye blinks have been noted as possible indicators of emotion (Lindsley, 1951; Orlansky, 1962). While no evidence exists on the use of eye blinks in the detection of deception, recordings of eye movements have been made and found useful in the differentiation of guilty and innocent subjects. Eye movements may be recorded by placing appropriate electrodes near the eye and amplifying the resulting signals, or by shining a light onto the cornea and projecting the reflected light through lenses onto photographic film. Using this corneal reflection method, Berrien (1942) explored eye movement variations in response to questions concerning a mock crime situation, but found no differences between the amount of eye movement present

during [illegible] questions and during neutral questions. During the preprestune period, however, guilty subjects showed a decrease in ocular tremor while innocent subjects did not. When judges were asked to classify as guilty those subjects whose records showed a decrease and as innocent those subjects who exhibited no change or an increase, the judges were on the average about 70% correct in discriminating guilty from innocent subjects. Differences in steadiness during the question period did not separate the subjects as well as did this criterion. Furthermore, the criterion successfully discriminated between guilty and innocent subjects when both groups were told the details of the mock crime before the crime was carried out and between two subjects who were not tested until the day after performance of the mock crime.

Ellson et al. (1952) reported a somewhat different approach to the determination of guilty responses. The subjects were instructed to remove a coin located in one quadrant of a box, and their eye movements were recorded during questioning again using the clinical detection method. Some subjects were instructed to tell the truth during questioning, while others were told to be concerning the judge's opinion about whether they had taken the coin. Eye movements to the guilty quadrant were greater in number than those to the other quadrants for all subjects. The difference, however, was greater for lying subjects than for truthful subjects. Critical questions caused more eye movements and eye movements of greater magnitude toward the guilty quadrant for subjects who were told that they could keep the coin if [illegible] concerning the experimenter's suspicions about them. During neutral questions the subjects who had taken the coin made fewer eye movements toward the guilty quadrant than did [illegible] subjects. [illegible] eye movements may be best in cases in which guilty subjects know details of the crime that innocent subjects do not know. Differences in the magnitude of responses to the semantically [illegible] stimuli, one of which is critical, could provide evidence of guilty knowledge.

[illegible] Reid and Inbau (1966) report that the measurement of the pressure with which the suspect bears down on the arms of the chair can often serve as an indicator of deception. These authors have developed pneumatic and Doppler sensors for detecting these movements, as well as movements of the thighs. They report that suspects will, at times, tense their muscles in an attempt to raise blood pressure and thereby confuse the polygraph operator. They consider such deliberate actions indicative of guilt. As noted earlier, Ellson et al. (1952) were able to derive a measure of muscular activity from EMG recordings that allowed some discrimination between truthful and deceptive responses.

Nonverbal behavior. Based on data derived from observations of psychiatric patients, Ekman and Friesen (1969) have studied those aspects of a subject's behavior that communicate deception to the observer. In studying strictly nonverbal behavior, they find that persons who observed the hands and feet were more likely to detect what they refer to as deception cues and leakage of genuine underlying affect than those persons who observed the face alone. Furthermore, they reported that facial expression, when studied in slow motion, reveals another kind of deception clue. Observed at normal speed, the face will reveal one affect while the eyes reveal [illegible] expressions that become clearly visible only in slow motion may show the very opposite expression.

It would seem that these studies address themselves to the kinds of cues which allow an observer to become suspicious about the presence of deception. Certainly, this approach is of great interest, but as yet little is known about the power of these techniques. Further, such an approach must still be compared with other techniques that have been used to study the presence of deception.

Quantitative Evaluation of Responses

The current practice of field examiners is to rely on subjective impressions of whether or not deception has occurred. The examiner studies the record and notes any significant changes or differences in the patterns of responses between the critical and control stimuli. The tendency to consider as potentially significant almost any change in the response pattern (Reid, 1947) creates problems in interpretation. To the experienced examiner working on [illegible] small changes may have

greater significance than do larger, more observable changes. Such may not be the case for the inexperienced examiner or someone examining the record post facto. In addition, examiners differ in the emphasis they place on the various measures, some relying primarily on respiration, some on "cardio," and some on the GSR (see Hathaway & Hanscom, 1958).

Laboratory studies, on the other hand, have tended to rely heavily on objective and quantifiable information such as the magnitude of the GSR (Block et al., 1952; Geldreich, 1941), GSR ranks (Lykken, 1959, 1960; Thackray & Orne, 1967), the *I/E* ratio (Burtt, 1921; Landis & Wiley, 1926), and systolic blood pressure (Chappell, 1929; Marston, 1917). Kugelmass et al. (1968) have attempted to score the "cardio" channel by connecting the "notches" of the tracings and measuring deflections from the baseline. Subjective impressions of several judges have even been quantified (Kubis, 1962). In order to quantify the responses, however, experimenters are forced to choose those measures that are obvious and amenable to quantification. With respiration, for example, laboratory studies generally rely on relatively crude measures of amplitude, frequency, or time relationships. Many possibly significant changes such as suppression, blockage, irregularities, or other subtle pattern changes are lost because they seem to defy ready quantification. Furthermore, invariant criteria are often applied to the responses of all subjects. In discarding much of the information available to the field examiner, however, a gain in reliability may be offset by the possible loss in validity. Kubis (1950) reports higher detection rates for independent experts who analyzed records resulting from an experimental situation than for persons using purely objective criteria, and the highest detection rates of all for operators interpreting the records on-line. Studies are needed exploring the possibility of quantifying the less regular aspects of changes in physiological records. While it is possible that a computer analysis might reveal measures contained in the variables, the computer must be programmed to derive these measures. The human investigator, therefore, is responsible for initially specifying the relationships and can rely on the computer only for information as to their usefulness in the differentiation between guilty and innocent subjects.

Another use of the computer is as an aid in discovering combinations of measures that will allow increased differentiation. Kugelmass and Lieblich (1968) applied a discriminant function analysis to data derived from the three channels of a field polygraph but found poorer detection with this combination than with a simpler sum of ranks. They felt that the low intercorrelations they obtained between channels in many subjects was a contributing factor in this poorer detection. Kubis (1962) applied individual discriminant analyses to examiner's ratings of the significance of GSR, respiration, and pulse volume responses. For the individual subjects, higher rates of detection were achieved with these discriminants. Because of the subjective criteria employed in the ratings, however, there was little equivalence in the discriminant weights among those who rated the same records. Kubis (1962) concludes, "In view of the fundamental problems which are yet to be solved in the objective measurement of the physiological patterns . . . the concern for obtaining optimal discriminant functions is a small matter indeed [p. 60]."

Definition of the Detection Rate

As mentioned earlier, the analysis of data gathered in a detection of deception experiment depends upon the paradigm under which the study has been conducted. The definition of the detection rate differs for the two paradigms. When all of the subjects in a study are known to possess guilty information (the guilty information paradigm), it is the *information* rather than the *individuals* that the investigator seeks to detect. Studies of this sort usually compare the relative rates of detection resulting from experimental treatments such as different levels of motivation, the subject's perception of his task, or orders of presentation. In such cases, it is quite satisfactory and appropriate to define the detection rate as the percentage of times the significant stimulus evokes the greatest response when compared to otherwise matched

control stimuli.[5] The fact that by chance alone this percentage could be, for instance, 20% does not diminish the importance of findings in which the experimental manipulation significantly affects detection. When all of the subjects are known to have guilty information, a greater response to a noncritical stimulus is a failure to detect the information sought and should affect the detection rate. Large responses to critical items result in the detection of the information and are thus successes.

An entirely different state of affairs exists when innocent subjects are introduced into an experiment. Such an experiment, following the guilty person paradigm, seeks to detect both guilty and innocent subjects, i.e., to discriminate between the two groups. To define the detection rate in such an experiment in the same way as for an experiment involving only guilty subjects, or even to redefine it as the percentage of individuals who exhibit their greatest response to the critical stimulus, is to ignore the chance factors operating in the case of the innocent subjects. Given a situation employing five stimuli, one of which is critical, and where some subjects may be innocent, all of the guilty subjects could exhibit their largest response to the critical stimulus. Detection of the guilty group, therefore, would be 100%. By chance alone, however, 20% of the innocent subjects would also show their largest response to the critical stimulus and would be misclassified as guilty. Such a situation results from overlapping response patterns in the two groups. In selecting the response pattern that allows maximal detection of the guilty subjects, in this case the greatest response to the critical stimulus, innocent subjects are unavoidably misclassified.

The Use of Multiple Indices of Guilt

There are a variety of strategies applicable in the laboratory situation to maximize the discrimination between guilty and innocent subjects. Each of these strategies involves changing the situation from the simple example just presented. Each also demands an understanding of the parameters that enter into making the decision of guilt or innocence. Perhaps the simplest way to increase discrimination is to increase the number of neutral stimuli (Lieblich, Kugelmass, & Ben Shakhar, 1970). With the same 100% detection of the guilty subjects, if the number of stimuli is increased to 10, one of which is critical, the percentage of innocent subjects misclassified will drop to 10%. It is just as possible to increase the number of critical stimuli, but, in such a case, the detection of guilt would require either a greater response to all critical stimuli when compared with responses to the neutral stimuli, or at least some proportion of the responses must be greater. The probability of classifying an innocent subject as guilty would depend upon the criterion used for determining guilt; chance factors would involve joint probabilities of occurrence (assuming that each stimulus is independent). Suppose that 8 neutral and 2 critical stimuli were presented and that those subjects who responded with GSRs greater to the 2 critical stimuli than to the others were classified as guilty. Then by chance, 10% of the innocent subjects would respond most to 1 of the 2 critical stimuli and 10% of 10%, or 1%, of the innocent subjects would respond more to both critical stimuli than to the neutral stimuli and would be misclassified as guilty. As the number of critical stimuli is increased, the likelihood of an innocent subject's reacting significantly to all of the stimuli would decrease rapidly. In reality, however, it would be unlikely for all of the guilty subjects to show their greatest responses to all of the critical stimuli. To maximize discrimination, therefore, it is often desirable to widen somewhat the definition of a guilty subject to include response patterns in which only a specified number of stimuli yield greater responses. In this way the number of false-negative subjects (guilty subjects classified as innocent) is reduced, while the number of false-positive subjects (innocent subjects classified as guilty) is increased. Similar arguments could be advanced for the case of additional trials. If several trials are given, each with the same stimuli, con-

[5] In the discussion we are dealing with ranked data rather than with ratio scores or other procedures that take into account the magnitude of differences. Under most conditions in our own research we have found, somewhat to our surprise, that ranked scores are as effective as more complex scoring systems which take the magnitude of a response into account. Ratio scores may be appropriate under some conditions, but in the absence of data indicating this to be the case this discussion is limited to a consideration of scoring by ranks. Experiments in this method of stimulus presentation and record analysis discussed in this section are in no way comparable to those in the field situation.

tinued high responses to critical stimuli would be unlikely to occur by chance, assuming minimal adaptation to the stimuli.

Separate distributions of guilty and innocent subjects can be established in the laboratory situation and each response pattern can be expressed in terms of the probabilities of falling into the guilty and innocent distributions. Each subject, then, could be classified as falling into that group for which the probability was highest (Hathaway & Hanscom, 1958). It is also possible to take into account factors such as the relative importance of avoiding false-positives and false-negatives. The elimination of false-positives would be more important in criminal investigations than in screening for a sensitive security position (Ben Shakhar et al., 1970). Much of the difference between the two situations arises from the fact that in criminal investigations only a few individuals, often only one, properly belong in the guilty group, whereas in screening, a large number of individuals may be in this category. The mechanism at work here is analogous to the concept of the selection ratio found in personnel selection (Cronbach & Gleser, 1965). Little work has been done in the laboratory with regard to the selection ratio problem. One would expect that, if the laboratory interrogator knew that only one subject in a group could be correctly classified as guilty, his approach would differ from his approach in the usual situation in which a number of subjects may be assigned to this category.

The process of combining probabilities to increase discrimination may be used not only across stimuli within one individual but also across individuals presented the same stimulus, provided that a response is available which can be readily averaged. The idea is analogous to that used in studying evoked cortical potentials with intact human subjects except that instead of time-locking multiple stimuli within the same individual, one observes simultaneously the response of multiple individuals to the same stimulus. If these individuals share the same guilty information, the averaged response to the critical stimuli should be maximized. Responses to the control stimuli, which may have idiosyncratic meaning to one subject or another, will tend to be minimized by averaging the responses. As a result, the signal-to-noise ratio will be markedly augmented.

A study by Orne and Thackray (1967) illustrates the use of this procedure. In this experiment the subjects were interrogated in groups of six subjects each, some groups being innocent and some guilty. Both individual and group GSRs, averaged across the individuals, were taken. The separation between the guilty and innocent subjects was shown to be very significantly improved through averaging. One would expect that with larger groups discrimination would improve still more, provided that all subjects are known to be either guilty or innocent. When the groups may contain both guilty and innocent subjects, one should be able to discriminate those groups containing guilty subjects, i.e., subjects with shared information, even if only a small proportion of the group consists of these individuals. The innocent subjects would merely add to the overall level of noise. While individual responsivity is difficult to predict, the responsivity of groups might well approach a mathematical function.

The Effect of Awareness

All of the research discussed so far is based on the assumption that the subject knows that someone is measuring physiological parameters to detect whether or not he is telling the truth. We have indicated, moreover, that motivation to deceive appears to be a major factor in making detection possible. One may legitimately wonder, therefore, how effectively we could detect deception if we had access to the physiological responses of an individual without his awareness that he was being recorded. This question, in view of present-day technology, cannot be considered totally unrealistic. It would be possible to sense at a distance parameters such as facial temperature, respiratory rate, and pupillary size. Appropriate concealed sensors could also measure the degree of fidgeting, some form of the cardioballistogram, and heart rate. Reid and Inbau (1966) report the results of research into techniques for recording respiration and body movements without the use of attached sensors. They report that results with the Doppler technique, whereby sound energy reflected from the subject may be analyzed to reveal relative

movement, corresponded closely to respiration tracings obtained in the usual manner, and that movements of the limbs could be accurately recorded. These measurements can be obtained without the knowledge of the subject if the sensors are concealed. Even ignoring the ethical considerations, one might wonder how helpful such equipment would be in the detection of deception. Some preliminary indication concerning this problem was yielded in the course of a study by Thackray and Orne (1967). Prior to a peak-of-tension series in a group experiment, the stimuli were presented to the subjects, ostensibly so that they would know the stimulus order in the subsequent test. During this presentation the subjects were led to believe that the equipment, located in an adjacent room, was turned off. Immediately after the presentation, the subjects were interrogated about these same words; i.e., they were requested to answer "No" to each item. The difference in detection rates between the preinterrogation presentation and the actual interrogation, while in favor of the actual interrogation situation, only approached significance ($p < .10$). Any interpretation of this finding must be tempered by the realization that the procedure confounded a number of variables and no systematic effort was made to establish whether or not the subjects believed the experimenter when they were told that they were not being recorded.

In the context of another study an attempt was made to get at the latter issue more directly. Thackray and Orne (1968b) arranged the courier situation so that as the subject was entering the interrogation room a technician was turning on the polygraph. A number of electrodes were then attached to the subject, and it was explained to him that it would be necessary for some of the sensors, particularly the oximeter, to stabilize over a period of time before the test could take place. Prior to turning on the polygraph and actually taking the test, the subject and the interrogator discussed the questions in a way similar to that of a real life detection situation, ostensibly in order to avoid confusion and surprise. During this time the subject's GSR responses were telemetered to another polygraph four rooms away. Once the discussion was completed, the actual examination took place. A subsequent attempt was made to determine whether the subjects believed that a recording was made during the pretrial test period. Only one subject reported such a belief. Nevertheless, it was not possible to demonstrate a significant difference between detection rates under these two conditions. Novelty and habituation worked against the hypothesis, there being no easy way to make plausible a reversal in the order of presentation. Furthermore, in talking with the subjects it became clear that, while they tended to believe that they were not being recorded during the initial presentation, they were very uncomfortable and felt strange with all of the sensors attached. It is difficult, therefore, on the basis of these studies, to answer the question of how subjects would behave if they were not in a polygraph situation. The findings do suggest that not merely the conscious belief that one is being monitored but the situation in its totality may be sufficient to evoke differential responsitivity.

Studies are needed that allow monitoring of physiological responses, particularly the GSR, without the subject's feeling that he is being monitored, preferably with little or no electrode attachment. We know remarkably little about the effect of being monitored. One suspects that the extensive habituation characteristic of physiological recording is partly a result of habituation of the subjects to the psychological situation of being recorded (Woodworth & Schlosberg, 1954). This response is usually confounded with the experimental treatment itself. With the development of small, portable, and easily carried telemetering equipment, it should be possible to minimize the effects of being monitored and approximate the recording of physiological responses in an unaware individual. There has been some recording of physiological parameters over many sessions during the course of psychotherapy (Coleman, Greenblatt, & Solomon, 1956; Malmo, Boag, & Smith, 1957). Watson and Kanter (1956) report an experiment in which both the patient and the therapist were monitored throughout the treatment. While the therapist reported the monitoring as having a considerable effect on him, at least initially, the patient was able to make therapeutic progress despite this situation. The importance of the material to him was probably such that it made less salient any

concern he might have had about the physiological monitoring. His major concern with the experimental situation centered around the presence of human observers, not the physiological measures. Again the heart rate, respiration, and EEG of astronauts have been monitored routinely throughout their flights, and without their reporting concern about the attached electrodes (Adey, Kado, & Walter, 1967; NASA Manned Spacecraft Center, 1962).

The issue of monitoring without awareness, however, is of importance in order to clarify some of the mechanisms involved in the detection of deception. The field situation is designed to take advantage of any psychological effects on the physiological response resulting from the suspect's awareness of being recorded on a machine. Many of the laboratory data mentioned here support the view that detection is possible only because of the individual's attempt to prevent detection. It is not clear whether this effort on the part of the subject is directed toward preventing detection through the physiological measures, or if he attempts to escape detection in the more general sense of controlling his tone of voice, manner, and overall behavior. Differences in physiological responsivity to highly affect-laden stimuli might emerge even more clearly if the individual were not aware that he was being monitored. In a like manner, conditioned GSR responses or anticipatory GSRs associated with the threat of shock should occur regardless of the subject's awareness of being monitored. On the other hand, there is no clear reason why a selected card or number should evoke a differential physiological response simply because an individual is required to "lie" and deny its selection.

The effectiveness of the lie detection procedure probably depends both on the subject's response to the content about which he is lying, as well as his awareness that his physiological responses are actually being recorded. Furthermore, there may be an interaction between the response to the arousal quality of the stimulus and the awareness of trying to deceive. The field interrogation takes place under conditions in which the stimuli have high intensive meaning and the subject is made maximally aware of his attempt to deceive and the consequences of being detected, probably the situation that most favors detection. Studies by Gustafson and Orne (1963) and Thackray and Orne (1967, 1968b) have compared this situation with others in which involvement or awareness was manipulated, but no studies have specifically investigated the situation in which the subject is not concerned with the evasion of detection and is unaware of being monitored. Such a study could clarify the relative importance of both variables in the detection of deception.

Means of Minimizing Detection

The problem of minimizing detection is the obverse of procedures whereby detection is made more likely. Implicit in considering factors of subjects and situations that enhance detection is a consideration of factors that may also serve to minimize detection. These factors have often been grouped together under the heading of "countermeasures." Inasmuch as successful detection involves responses to relevant stimuli that differ in some way from responses to nonrelevant stimuli, countermeasure techniques attempt to reduce this difference. There are two principal means to reduce the difference in responses, increasing the level of response to irrelevant items or reducing the level of response to the critical items. Either method would bring about a reduction in the signal-to-noise ratio. The first method implies either an increase in the overall activation level, until additional responsiveness to critical items is small, or the production of false-positive responses to irrelevant items. The second method implies a reduction in responsivity on either a general or a specific level, brought about by voluntary suppression or by techniques involving drugs, hypnosis, or conditioning.

The voluntary production of false-positive responses The experimental literature on countermeasures has focused on the production of false-positive responses to neutral stimuli (Kubis, 1962, Lykken, 1960). Kubis (1962) trained subjects in three types of countermeasures, two of which involved the production of false-positive responses. The subjects were told either to generate exciting mental imagery to the neutral stimuli or to clench their toe muscles in response to the same stimuli. Using

GSR, respiration, and pulse volume as response measures, both imagery and muscle tension resulted in a significant reduction in detection rates. Kubis (1962) concluded that "the most important result underlying the successful use of countermeasures is the inability of a lie detection operator to distinguish the physiological reactions in deception from those in simulated deception. In other words, the tensing of the muscles and the bringing to mind of exciting thoughts produce a physiological pattern that cannot be distinguished readily from that found in lying [p. 104]." More (1966), however, claims to have replicated the Kubis (1962) study and reported that the same countermeasures led to a much smaller reduction in the detection rate than found by Kubis. More argues that his results "indicate that a carefully trained examiner can interpret a polygram even though countermeasures are being taken by the subject [p. 75]."

Block et al. (1952) used a conditioning paradigm to produce false-positive GSR responses to neutral stimuli. During a card test the subjects were shocked for "No" responses to cards other than the one they had chosen, presumably on the assumption that shocking subjects for telling the truth would lead to heightened autonomic activity when telling the truth in subsequent trials without shock. Responses to neutral stimuli did not increase relative to critical stimuli, as was expected, but there were fewer measurable responses to all stimuli and an increase in the magnitude of the GSR during deception.

A primary disadvantage in using false-positive responses as a countermeasure stems from the nature of the field examination. As Reid and Inbau (1966) point out, unusual responses, particularly those to irrelevant stimuli, should be discussed with the suspect in an attempt to uncover plausible explanations for these responses. Unexplainable responses, movement, or a lack of attention to the interrogator may be considered prima facie evidence of guilt. These authors endorse the use of arm and thigh movement detectors to uncover evidence of muscle tension (Reid, 1945) and caution operators to be constantly aware of the possibility of conscious acts by the suspect to distort the record. An individual with a good knowledge of the examination procedure may produce responses at appropriate times and thus deceive the operator. Such an effort would require a knowledge of the order of the questions presented, as pointed out by Gustafson and Orne (1964). These investigators also note that detecting guilty information, such as the card choice in the Kubis (1962) study, allows the subject to mislead the experimenter by producing false responses, but the detection of a guilty person does not lend itself to such a strategy. The least suspicious pattern of false responding would seem to be the production of responses to all stimuli, relevant and irrelevant alike.

Experimental work dealing with increased general activation as a countermeasure has not been reported, although it is known that highly anxious subjects are often difficult to detect (Reid & Inbau, 1966). It would seem that increasing the activation of a subject should lead to a lessened difference between critical and noncritical responses because the subject is already at a level where further stimulation would have little effect. Obviously, however, a person would have to be capable of sustaining a high level of activation throughout an entire examination period. Reid and Inbau (1966) suggest that highly anxious or overly reactive suspects should be questioned about a fictitious crime, as well as about the crime in question. A lack of reactivity to questions concerning the fictitious crime would indicate deception concerning the actual crime.

The suppression of autonomic responses The entire basis for the detection of deception rests on the premise that the autonomic nervous system responds in an involuntary fashion; i.e., the conscious control of this system is difficult. There is, however, an increasing body of literature concerning the control of autonomic activity, by means of drugs, hypnosis, and particularly conditioning techniques. (See, for instance, Razran, 1961, for a review of Russian literature on conditioning.) Little research, however, has been directly concerned with response suppression in detection of deception situations.

The voluntary suppression of responses Kubis (1962) has published the only study directly involved with the voluntary suppression of responses during the detection of deception. As part of the

previously mentioned study on countermeasures, his subjects attempted to assume a detached, "yoga" sort of attitude. He found these subjects no more difficult to detect under this condition than when given the usual instructions. Numerous authors have speculated on the inability of subjects to suppress affect at will (see Gustafson & Orne, 1964; Lykken, 1959).

The most important factor in this seeming inability to control autonomic responses is probably that the subject receives no feedback from the response he gives (Brener & Hothersall, 1966). Several studies indicate that providing feedback to subjects of heart rate information allows them to reduce heart rate variability (Hnatiow & Lang, 1965) and to increase or decrease the heart rate (Brener & Hothersall, 1966). Such feedback may take place naturally with the GSR (Reiser & Block, 1965). Kamiya (1969) has demonstrated that alpha activity in the EEG may be controlled by subjects who are informed of its appearance. The process by which subjects may learn to control autonomic activity is dependent upon providing appropriate feedback to the individual about changes and/or their direction in the parameter under investigation. Much of this work has been conceptualized as instrumental conditioning since in human studies the presentation of the appropriate feedback stimulus can serve as a reinforcer, and little effort has been made to separate reinforcement from informational aspects of the feedback stimulus. Again, partial reinforcement schedules are difficult to distinguish from intermittent feedback. It remains to be established, however, whether changes in the amount of feedback parallel those observed with varying the ratio of reinforcement contingencies. Nonetheless, it seems likely that learning to control autonomic functions in man is best understood as the consequence of feedback in individuals motivated to achieve such control rather than being due to the effects of discrete simple reinforcers.

The conditioned suppression of responses A great deal of research has been done concerning the conditioning of autonomic responses, primarily the GSR (Crider, Shapiro, & Tursky, 1966; Grings & Carlin, 1966; Kimmel & Hill, 1960; Stewart, Stern, Winokur, & Fredman, 1961) and heart rate (Brener, 1966; Notterman, Schoenfeld, & Bersh, 1952), although work has been done with other responses as well (Razran, 1961). These efforts have involved both classical and instrumental paradigms. The majority of these investigators have sought to establish responses to previously neutral stimuli, rather than extinguish responses already present. No one appears to have used the classical paradigm to suppress an autonomic response.

Several operant conditioning studies have examined the suppression of a response, particularly the GSR. Shapiro and Crider (1966) report that they were able to demonstrate increases in GSR activity with reinforcement (money) contingent upon the production of GSRs and also decreases in GSR activity with the reinforcement contingent upon inhibition of GSRs. An inspection of their data, however, shows the increase in activity to be much more striking than the decrease in activity. When reinforcement was contingent upon a lack of response, activity decreased greatly from the level during reinforcement for responding. The level during reinforcement for lack of responding was not, however, much less than it was during periods of nonreinforcement. Senter and Hummel (1965) performed an experiment in which one group of subjects received an electric shock each time a spontaneous GSR occurred. A control group received similar shocks at times when their experimental partners had received them. During the subsequent test period the experimental subjects showed a significant reduction in the number of spontaneous GSRs emitted, when compared to the number emitted by their yoked control subjects, whose number of GSRs actually increased. They also found that abrupt changes in the GSR consistently occurred between the spontaneous GSR and the shock in the experimental subjects and conclude that the spontaneous emission of a GSR "bears a sensory correlate which can act as a stimulus element in operant conditioning [p. 4]." Using the heart rate as a response, Engel and Hansen (1966) demonstrated that some subjects, particularly those who were not aware of the contingency between the feedback and their heart rate, were able to lower their rate significantly below that of their yoked control subjects.

The ability of operant conditioning techniques to suppress a response pattern to critical emotional

stimuli has not been demonstrated. Even if a person is conditioned to suppress responses to GSR, heart rate, respiration, and other variables separately, he could experience difficulty in the simultaneous control of all of these measures while maintaining normal external appearance to the interrogator (Orlansky, 1962). It may be possible to condition a lack of concern for the critical issues of the examination. There is some evidence that a lack of concern leads to low rates of detection, both in laboratory settings (Gustafson & Orne, 1963) and in field settings involving abnormal personalities (Floch, 1950; Kubis, 1957). Outside of the one laboratory study just mentioned, though, little research has been directed toward this topic. Studies of subjects who are difficult to detect or who show low reactivity to critical stimuli indicate them to be less theoretical and abstract in their thinking than sensitive subjects (Iwahara, Miseki, Shiokawa, & Yoshida, 1960). They are also characterized as cool, independent, opportunistic, practical, and realistic by their responses to the Gough adjective checklist (Block, 1957). Ethnic background also seems to be a determiner of differential reactivity (Kugelmass, 1967; Kugelmass & Lieblich, 1966).

The use of drugs The use of drugs as aids to interrogation has been adequately reviewed elsewhere (Gottschalk, 1961) and will not be considered. This literature has dealt with the use of sedatives, stimulants, tranquilizers, or hallucinogenic drugs as possible aids in maximizing the effects of interrogation. The use of drugs to minimize detection, on the other hand, especially when the polygraph is employed, has not received much attention in print. Davis (1961) considers alcohol, barbiturates, and perhaps tranquilizers to be of possible use in minimizing detection, but the lack of empirical investigation renders this view speculative. On the basis of known evidence relating the effects of various depressants and tranquilizers to autonomic and central nervous system activity and behavior (Trouton & Eysenck, 1961), it could be predicted that the use of such drugs would impair detection. One of the more troublesome aspects of the use of drugs as countermeasures, however, is the possibility that the interrogator will discover that drugs have been taken. Unless a plausible reason can be found for the taking of a drug, this act may be considered prima facie evidence of the intent to deceive. Reid and Inbau (1966) state that doses of tranquilizers sufficient to depress responsivity usually produce obvious behavior abnormalities and suggest that the examination be postponed until the interrogator can be sure that no drugs have been taken which would alter the effectiveness of the test.

The use of hypnosis Hypnosis has been considered as a technique for either maximizing or minimizing detection (Orlansky, 1962), although evidence suggests that the use of posthypnotic amnesia to suppress autonomic responses is generally ineffective. Germann (1961), for example, induced posthypnotic amnesia in five subjects, screened for deep trance capability. Clinical evaluation of the GSR, blood pressure, and respiration responses to the critical stimuli showed that amnesia did not prevent an increased autonomic response to these items. Bitterman and Marcuse (1945), in a series of hypnotic inductions with one subject, were likewise unable to demonstrate any reduction in autonomic response resulting from posthypnotic amnesia. However, no data are available about other possible uses of the hypnotic phenomenon to prevent detection. Hypnosis might, for example, be used as a means of decreasing an individual's anxiety, either by direct suggestion or along the lines of systematic desensitization, making the subject more sensitive about a pseudocrime that was never committed by the use of appropriate suggestions. Alternatively, it could be used to induce a state of high anxiety that would make differential responsivity difficult to recognize, or to vary the effect of the meaning of the stimulus, rather than its recognition. Studies of this kind, carried out with appropriate waking controls, might help clarify the nature of hypnosis, as well as help to shed light on some of the mechanisms involved in causing the differential responsivity upon which the detection of deception is based

CONCLUSIONS

In this review independent variables have been categorized for the purpose of organization. It must be recognized, however, that such categorization distorts some of the more complex effects these

variables may have. For example, there is almost no increase in responsivity when subjects are asked to lie about a card they have selected, unless they are motivated to deceive; yet in another study in which the stimulus material has great intrinsic meaning, differential responsivity occurs even when the subject is telling the truth. Such findings are not contradictory, although one might well be tempted to draw such a conclusion; rather, they indicate that several factors play a role in the detection of deception. Either the attempt to deceive or the intrinsic significance of the stimulus may be responsible for the physiological response, and an experimental study may emphasize one or the other factor by the nature of its design.

Most studies to date have only begun to examine the effect of independent variables singly, and certainly such research is essential. Yet a full understanding of the phenomena involved in the detection of deception will need to take into account some of the significant interactions between these variables. Many of the apparent inconsistencies found between studies may ultimately be resolved when the effects of these interactions are clarified. We have tried to discuss the factors that seemed likely to play a role in this process, but it has become clear that even the apparently simple laboratory situation is highly complex and many aspects of the field situation remain to be subjected to meaningful analysis

The detection of deception has not, however, been an area of much systematic research. Perhaps because of its applied implications, the field has been avoided by psychologists and physiologists alike. Psychophysiologists, in the search for professional identity, have seemed least interested in the phenomenon that the public most closely identifies with the polygraph. As a result of the increased status of psychophysiology, the intrinsic interest of the problem may receive the attention it deserves. There is little doubt that both psychological and physiological variables play large roles in determining the ability of a person using polygraphic techniques to judge whether or not another individual is guilty of deception. The conditions prevailing in the detection of deception situation seem to provide an almost unparalleled opportunity for psychologists to study those contingencies under which a psychological stimulus will or will not evoke an augmented physiological response. Clarification of these problems may be of interest to individuals professionally engaged in "lie detection." This in no way, however, diminishes the scientific importance of the phenomenon. It provides a paradigm for studying the effect of cognitive, motivational, attentional, and learning factors upon the physiological responsivity to verbal stimuli. It would seem appropriate that, instead of viewing the practical application as a detriment, we recognize its potential advantage in providing a means of testing the ecological validity of our findings outside the laboratory context. Because the detection of deception model allows systematic quantitative analysis, it provides a meaningful way of learning about the variables involved and the interactions, at least as they relate to one set of psychophysiological contingencies. An understanding of these relationships is likely to facilitate the use of physiological techniques to clarify other, and perhaps ultimately more important, aspects of psychological functioning.

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April 23, 1974

Calvin C. Quigley, Colonel, USA
Acting Director, Security Plans & Programs
ODASD (Security Policy)
Washington, D. C. 20301

Dear Col. Quigley:

Enclosed please find a summary article which brings together the state of the art from its psychological and physiological points of view. The studies outlined were carried out in the context of a program of basic research on the detection of deception. We have some interest in continuing these studies and would welcome the opportunity of discussing the matter with you at your convenience.

Thank you for your interest in our work.

Very sincerely,

Martin T. Orne, M.D., Ph.D.

MTO:mcw
Enclosure

PRESENT STATUS OF DoD RESEARCH ON THE POLYGRAPH

August 28, 1968

Report of the DoD Joint Services Group On
A Coordinated R&D Program of Lie Detection Research

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SUMMARY

This report summarizes the work accomplished by the DoD Joint Services Group on a Coordinated R&D Program of Lie Detection Research from its inception in June 1965. A research program was developed to determine the reliability and validity of the polygraph in judging lie detection and some preliminary studies have been completed. However, the reliability and validity of the polygraph cannot be determined in a reasonable amount of time due to the reduced use of the polygraph and to problems encountered in undertaking the required validation study.

PRESENT STATUS OF DoD RESEARCH ON THE POLYGRAPH

Introduction

On 13 April 1965, the Director of Defense Research and Engineering designated the Air Force as the responsible military department to conduct a program of research on lie detection, with four major tasks:

"a. A study of the validity of lie detection based on existing records of security and criminal cases where evidence independent of the polygraph is available.

b. An experimental study of interrogation methodology.

c. A study of inter-examiner reliability and examiner performance differences.

d. A study of the reliability of various physiological measures with actual or potential relevance to lie detection." (Reference 1)

This memorandum also established a Joint Services Group to monitor this program. The Group included representatives of research and of operational activities from each military service and reported to the Deputy DDR&E/(Research and Technology). The Assistant Secretary of Defense (Administration), Directorate for Security Policy, was represented on this Group and technical liaison was established with the CIA.

After several meetings, this Group recommended a research program which would start with six studies:

"a. Evaluation of basic instrumentation now employed in polygraph examinations for the assessment of the reliability and adequacy of measurement of the physiological changes assumed to be significant. The test standards and methods for this purpose will be established by an unbiased agency, the National Bureau of Standards.

b. An extensive field test of the reliability of polygraph field instrumentation in use.

c. A study of the reliability of examiners in polygraph chart interpretation.

d. An attempt to establish external criteria in criminal cases which will make it possible to perform studies of the validity of each aspect of the polygraph examination.

e. An examination of the possibilities inherent in modern instrumentation and computer data processing in the assessment of physiological changes.

f. Collection and analysis of descriptive statistics on polygraph operations." (Reference 2)

The Air Force provided $200,000 in October 1966 to support this program, designated as Project 4356, at Rome Air Development Center. Earlier, the Air Force transferred $16,500 to the Navy for a contract to the National Bureau of Standards to evaluate the response characteristics of two standard polygraph instruments. A total of $111,516 was actually spent, with $104,984 reserved for studies awaiting approval. Although a continuing program of research was contemplated, no funds were provided in FY 1968. A financial report is contained in Appendix I. A summary of our findings follows.

Evaluation of the Standard Polygraph Instrument

The National Bureau of Standards evaluated the response characteristics of the two standard polygraph instruments used by the military services. (Reference 12) These instruments were a "Deceptograph" Model 22500 manufactured by C.H. Stoelting Company and a "Keeler Polygraph" Model 6303 manufactured by Associated Research, Inc. Each instrument was brand new and, before being tested, was set up for operation according to the manufacturer's instructions. Each instrument contains three units:

(1) the cardiograph unit which records heart rate and changes in blood pressure,

(2) the pneumograph unit which records breathing rate and changes in volume of tidal air, and

(3) the galvanic skin resistance (GSR) unit which records the resistance of the skin to a minute, not perceptible, externally applied electrical current.

The cardiograph and pneumograph units are air pressure devices; the first is a blood-pressure cuff wrapped around the upper arm and the second is a flexible rubber bellows placed around the subject's chest. The GSR consists of two small electrodes, to be placed on the fingers, an amplifier and galvanometer. The output of each unit drives one of three recording pens, which leave traces on a chart moving at the rate of six inches per minute (0.1 inch per second).

The investigation was conducted by using known physical inputs within the range of human response to drive each polygraph unit. Calibrated pressure signals were used as the physical inputs to test the "cardio" and the "pneumo" units. Electrical signals of known strength were used for testing the GSR system. Static and dynamic tests were conducted.

Pneumograph Unit

The NBS tests showed that the pneumograph system of both polygraphs is a realistic measure of breathing rate and magnitude. However, the responses of the Keeler polygraph tend to be non-linear in amplitude with a small increase in pressure.

Cardiograph Unit

Pen deflections, as a result of calibrated incremental pressure changes over the operating pressure range, show that the Stoelting polygraph varies less than does the Keeler.

GSR Unit

The ability of the Keeler polygraph to measure skin resistance of the subject decreases as the subject's resistance

increases. This instrument's sensitivity is dependent upon the level of the subject's resistance, which varies during an examination. The Stoelting polygraph is essentially independent of the level of the subject's resistance and it produces a monotonic indication of changes in resistance.

Both instruments were mechanically stable at all times during the tests and electronically stable after a warm up period of 30 minutes. Used before warm up is completed, they may drift. There is a resonant frequency in the writing pens at a frequency of 8-9 Hertz, which is probably not significant for most purposes. However, there is a resonant frequency in the 3-5 Hz range which may affect high rate cardiograph readings.

These several findings do not necessarily imply that the non-linear input-output characteristics influence adversely the interpretation of charts by polygraph examiners. This important matter can only be resolved by validation tests directed specifically to this question.

Calibration of Polygraphs In Field Use

The purpose of this study was to determine whether polygraph instruments perform as specified under ordinary conditions of use. (Reference 11) Calibration tests were performed on 17 Keeler and 40 Stoelting instruments used by the three military services; 24 locations were visited. This sample of 57 instruments is about 14 percent of the 408 polygraphs owned now by the Department of Defense. In 1963, the DoD had 422 of the 514 polygraphs owned by the U.S. Government. (Reference 13)

The following data show how many of these 57 instruments performed within the specifications, according to each component:

Component	Performed According to Specification			
	Stoelting (Total = 40)		Keeler (Total = 17)	
	N	%	N	%
Pneumograph	37	93	7	41
Cardiograph	33	83	16	94
GSR	20	50	2*	17

*Only 12 Keeler instruments had a GSR component

The chart speed performed according to specification on all except two instruments, i.e., 96 percent. The pneumograph in 13 polygraphs (23%) provided a larger signal than required in response to large inputs and hit the limit stop. The cardiograph unit was non-operable in two instruments and six (10%) had slow leaks. A non-operable instrument is preferable to one which operates incorrectly and provides misleading data. The GSR unit on the Stoelting polygraph responds linearly and almost instantaneously, while on the Keeler it lags about 20 seconds and shows a non-linear response. It is well to remember that the polygraph instrument contains three components. Therefore, the percent of instruments found to be in complete working condition depends, in effect, on the component which most often does not meet its specification. Of the three, the GSR component is most likely not to perform properly.

Little comfort can be taken from these results except, perhaps, if they lead to periodic calibration of all instruments. The cardiograph and pneumograph units are supposed to be tested for sensitivity and leaks before being used, but this is not equivalent to being calibrated against an independent standard.

The significance of improper calibration upon the validity of decisions of deception based on polygraph readings is not known. The lack of calibration may or may not produce an effect. Nevertheless, proper calibration cannot possibly reduce the usefulness of the polygraph and it should be made standard

operating procedure. At present some examiners give less weight to the GSR than to the other measures and some ignore it completely. Perhaps the GSR would prove as worthwhile as the other indicators if this component was properly calibrated and maintained in this condition throughout the examination.

To the best of our knowledge, no calibration device is used at present by the DoD. Although some Stoelting instruments contain an internal device for calibrating the GSR, our data show that there is room for improvement. A calibrator which costs $200 can be provided for each installation at which a polygraph is used, together with the suggestion that it be used before each examination.

Agreement Among Examiners in Reading Polygraph Charts

A study was performed to determine the reliability with which polygraph examiners interpret charts in the complete absence of information from other sources. The information presented here is based on a progress report. (Reference 7)

Reliability measures the extent of agreement or consistency between examiners but not whether the judgments are correct. However, reliability does affect validity of judgments; it imposes an upper limit upon validity. A polygraph examiner probably bases his judgment of Deception Indicated or No Deception Indicated on several sources of information, such as the case file, the investigator's verbal report, impressions gained during the pre-interrogation interview, observations of the subject during the polygraph examination and, of course, the tracings on the polygraph chart. The purpose of this study was to establish the reliability of the polygraph chart as the sole basis for judging deception, i.e., in the absence of all other cues. Reading charts in this fashion, which we called "blind," is not the way in which a polygraph examination is usually conducted.

A large number of charts was obtained from the three military services. From these, 90 sets were selected at random to comprise 30 for each type of polygraph examination: Zone of Comparison (ZOC), General Question Test (GQT) and Peak of Tension (POT). The sets were also selected so that half were judged by the original examiner as Deception Indicated (DI) and half No Deception Indicated (NDI), except for the POT set where this criterion does not apply. Charts judged inconclusive by the original examiner were not used. All identifying information, including handwriting, was removed from the charts. The charts contained only marks to indicate the onset of a question and of the subject's reply and stamped labels designating a question as "control" or "relevant."

These charts were judged by 30 examiners, 10 selected at random from each military service. Each man worked alone and was monitored by a highly experienced supervisory examiner. Judgments were based on a complete set of charts (two or three charts per subject). To insure a detailed examination of the chart tracings, examiners were subsequently required to provide judgments on each response (blood pressure, respiration and GSR), on each question as a unit, and finally once again on the entire chart set. For the POT charts, the examiners were asked simply to specify the question (one or more) to which the subject showed a peak response.

The agreement between individual examiners is low (correlation coefficients range from .23 to .44, depending on the type of polygraph examination). The agreement between the orginal examiner's decision and an individual "blind" analyst is better than chance in our study (mean kappa coefficients range from .15 to .51). The Zone of Comparison test shows a higher reliability than the General Question Test. Deception Indicated charts yield higher reliability coefficients than No Deception Indicated charts. The reliability with which "blind" analysts identify the peak question on Peak of Tension

charts could only be evaluated crudely. The level of agreement among analysts, as indicated by the number who select the same peak response, ranges from 30 to 93 percent for the 30 charts.

Ordinarily, examiners read only their own charts, i.e., the product of tests they themselves have conducted. Therefore, our test is, to some extent, an artificial situation. Nevertheless, the fact appears to be that agreement among examiners in reading charts, without also running the examination, is not high. An interpretation of these data must include the fact that the examiner normally can use other information in evaluating a polygraph examination than the record itself. We do not yet know the extent to which examiners would agree if they could simultaneously observe all parts of an examination.

Comparison of Polygraph Results With The Investigative File

An attempt was made to validate judgments made by polygraph examiners in criminal cases against judgments of guilt or innocence made by a panel of lawyers who had access to the complete investigative file from which all references to the polygraph examination were removed. (Reference 6) Guilt or innocence as judged by a jury or a court martial would not be a meaningful criterion since some judgments of innocence are based on legal technicalities. Confessions were also ruled out because some confessions later prove to be false and because some polygraph examiners may have made their judgment of deception after the subject had confessed. There are many case files on criminal investigations, each of which included a polygraph examination, conducted by the military services. Cases were selected at random from the 1963 to 1966 period so that there would be about an equal number of each type of polygraph examination and, within each type, an equal number of judgments of Deception Indicated and No Deception Indicated by the original polygraph examiner. No cases judged Indeterminate were employed. Polygraph records were removed from these files, and all references

to the polygraph test were eliminated. Three hundred twenty-three case files in all were submitted to the panel. Each member of the panel was initially required to judge whether a file contained sufficient evidence to warrant a decision of guilt or innocence. Files with inadequate evidence were eliminated from further consideration. Then each attorney made an independent judgment of the guilt or innocence of a suspect. The attorneys were given explicit instructions to disregard all legal technicalities and to judge each case solely on the evidence contained in the file. The final number of cases in each category which met the requirement of sufficient evidence and resulted in a unanimous panel decision was as follows:

	Type of Examination		
	Zone of Comparison	General Question Test	Total
Deception Indicated	37	35	72
No Deception Indicated	52	33	85
Total	89	68	157

In a preliminary experiment, it was found that unanimity of four (but not three) JAG attorneys also meant unanimity among nine JAG attorneys. It was for this reason that, in the main study, four JAG attorneys were used. The results for unanimous decision cases are shown below:

COMPARISON OF POLYGRAPH EXAMINER'S JUDGMENT AND UNANIMOUS JAG PANEL DECISION IN ALL CASES

	Polygraph Examiner's Judgment		
Panel Judgment	Deception Indicated	No Deception Indicated	Total
Guilty	65	5	70
Not Guilty	7	80	87
Total	72	85	157

The polygraph examiners and JAG panel agreed on 92 percent of all cases. Some breakdowns, all significantly better than chance agreement, follow:

Deception Indicated	90 Percent
No Deception Indicated	94 Percent
General Question Test	93 Percent
Zone of Comparison	91 Percent

The amount of agreement drops to about the 75 percent level if majority decisions of a JAG panel, as well as only the unanimous ones, are used as a basis of comparison.

Because we had to depend entirely on the information which appeared in the case files, certain questions can be raised about these findings which we are not able to answer. Thus, we do not know whether the original polygraph examiner made his judgment solely on the basis of the polygraph test or if he had access to some investigative information concerning the possible guilt or innocence of the suspect. Indeed, instances are not unknown in which a polygraph examiner reports Deception Indicated on a test because a suspect has confessed after the test. Our inability to cope with such questions or, more precisely, the limitation in our control over the experimental data, illustrates the dilemma faced in the use of historical records for research on the polygraph. Recognizing the various qualifications, the findings suggest agreement, at the 90 percent level, between polygraph results and an independent judgment of probable guilt or innocence.

Collection of Polygraph Data For Analytical Purposes.

Polygraph chart traces are ideal for visual analysis but cannot be used, in that form, as inputs to a computer. We have found that it is expensive to transpose ordinary polygraph charts from analog to digital form for computer analysis.

Accordingly, a Polygraph Data Storage System was designed

and two units were procured. (Reference 10) This system consists of a standard polygraph instrument with additional equipment to record the physiological responses in digital form on magnetic tape. The system in no way impairs the tracings which may still be inspected visually and for all practical purposes the modified polygraph is identical to a standard instrument. This device makes it possible to collect polygraph records under a wide variety of field conditions for detailed analysis by means of a computer at a later time.

Feasibility of Automatic Data Processing of Polygraph Responses

The purpose of this study was to improve the conversion of records on a conventional and an advanced multichannel polygraph from analog to digital coding and to devise computer programs for on-line analysis and display of the data. (Reference 9)

The computer programs have been written which will accept the on-line data, plus analog-to-digital conversion, for IBM 360 processing of four channels of EEG (frequency-to-duration transfer of primary frequencies as well as the first and second derivative of each), GSR, Inspiration and Expiration, Pause Time, Plethysmograph and Electrocardiogram.

Pilot studies and preliminary analysis of the data show that the advanced polygraph offers a significant increase in reliability and validity for identifying emotional responses. The test populations used for interrogation were both simulated and real violaters of the law (Texas Department of Public Safety) while the examiners were both professional (Texas Rangers) and university experimenters. Immediate feedback appears to help the examiner by enabling him to select optimum areas of interrogation for further exploration and greatly reduces the time required for eyeball interpretation and final decision processes.

A final report on this study is due in September 1968.

Descriptive Statistics

Steps were taken to determine the number and type of polygraph examinations in criminal cases conducted by the military services. The summary is as follows:

Service	No. of Polygraph Examinations in Criminal Cases Per Year			
	1964	1965	1966	1967
Army	4852	3014	583	782
Navy		1875	1349	372
Air Force	1117	737	414(1)	291
		5626	2346(1)	1445

(1) Estimated value for one year derived from the number of examinations in a period of six months.

The number of polygraph examinations in criminal cases in 1966 and 1967 dropped to about 42 and 25% of the number for 1965. This coincides with the interest of the Moss Committee in the use of the polygraph by government agencies. In 1967, the use of the polygraph by the Army showed a slight rise from 1966 while its use by the Navy and Air Force continued to decline. Further information is available concerning the types of crimes and the determination made by the examiners in cases where the polygraph was used. Data are not available concerning the use of the polygraph for security screening. (Reference 8)

Validation Studies Proposed But Not Carried Out

The major reason for research on the polygraph is to determine its validity, more commonly called accuracy. Validity is defined as a measure of the agreement between the results of a polygraph examination in the absence of any other information and some independent and acceptable way of establishing a person's true guilt or innocence. Validity should be

distinguished from reliability. Reliability is simply a measure of agreement between two or more examiners on the same case (or between two tests by the same examiner); i.e., it is a measure of consistency. Unfortunately, it is possible to be both consistent and wrong. On the other hand, high accuracy is not possible if reliability is low. Validity, i.e., agreement of a polygraph examination with "the truth" (as measured in a test program) is, obviously, the central issue concerning the value of the polygraph as a test of deception in routine use.

It is relatively easy to measure the validity of the polygraph in a laboratory because steps can be taken to insure precise knowledge of the subject's "guilt" or "innocence" and to insure independent judgments by the polygraph examiners. As an example, a subject is told to select a particular card from a deck and to respond with the word "No" to all questions about it or any other card. The experimenter can keep the card while the polygraph examiner's task is to determine the subject's choice solely on the basis of the polygraph test. A more complicated laboratory test of validity is to contrive the subject's participation in some simulated crime, like acting as if he stole a book from a college bookstore, or perhaps even to steal a book (whole arrangements have been made for the bookstore manager to look the other way). Experiments of this sort are not regarded as conclusive because, it can be said, the subject does not have a real motive to deceive the examiner, or does not exhibit the same emotions as that of a guilty person in an actual crime. Thus, even though the "laboratory" experiment offers precise control and knowledge of events, some observers do not wish to accept the results of such experiments.

The problem faced by the Joint Services Group, therefore, was to find real life situations in which the result of a polygraph examination could be compared to an accurate source

of independent information. This was not an easy task but the committee was able to develop two experiments. We learned that some military recruits are processed for a security clearance. This involves filling out a Statement of Personal History, which is then verified by means of a National Agency Check. The National Agency Check collects background information on criminal and subversive activities on file with the FBI and other agencies. Assuming proper arrangements could be made, we wanted to compare the accuracy of the polygraph for judging deception in filling out the Statement of Personal History form against the independent information disclosed by the National Agency Check.

A variety of administrative and legal problems would have to be solved before one could request recruits to volunteer for a polygraph examination on their Statement of Personal History. The proposed experiment received sympathetic consideration but it was not approved. (Reference 5)

In another part of our program, we proposed to photograph actual polygraph examinations in criminal cases to provide material for a series of experiments. Using TV, we recorded a complete polygraph interrogation of a simulated crime, with excellent results. The record included a view of the subject as seen by the examiner, the spoken questions and answers, and a simultaneous view of the polygraph tracings. This record of a complete interrogation makes it possible to compare judgments of deception by many examiners, something which, for practical purposes, cannot be done in real life. Furthermore, with such recordings, one can investigate the contribution of each part of a polygraph interrogation to the validity of the judgments made by the polygraph examiner. Thus, the relative importance of the investigative file, the pre-examination interview, and the polygraph charts could be explained. It would be a simple matter, for example, to use only that part of the video tape depicting the pre-examination interview in order to determine

how accurately experienced examiners could judge deception on the basis of the interview alone. Since some of the recorded cases would go to actual trial, it would also be possible to compare judgments of deception based on the polygraph against the court's verdict, complete files of the investigation, or any other criterion.

Arrangements were made to guarantee full legal protection to subjects willing to permit audio-visual recording of their polygraph examination. This study was approved but not carried out because of the marked reduction in the number of polygraph examinations in criminal cases conducted by the Department of Defense. As noted above, this number was reduced from 5626 in 1965 to 2346 and 1445 in 1966 and 1967, respectively. Further, these examinations took place throughout the world with no large number at any one location. For research purposes, a large number of examinations would have to be recorded to provide sufficient numbers in each category of interest, i.e., Deception Indicated or Not Indicated, for each type of polygraph procedure. Even assuming that all subjects would consent to TV recording, the useful experimental data would be further reduced because we might not be able to collect complete background information on each case. At the rate examinations were being conducted in 1967, it was estimated that it would take the recording team three or more years just to collect the required information at one or more of the most active installations. After much consideration, this study was not carried out because, in effect, too few examinations were being conducted to support a research program.

Some consideration was given to carrying out these studies in other organizations, such as an intelligence agency or a police department. It was concluded that the use of the polygraph for screening purposes did not provide means for sufficient experimental control without significantly altering the way the polygraph is used in intelligence agencies. Tests on

criminals in the custody of police offer severe problems in establishing "the truth" concerning a suspect's alleged crime, control over the knowledge made available to tne polygraph examiner, as well as the physical condition of the subject at the time of the polygraph examination.

Concluding Remarks

The Joint Services Group has been able to accomplish only part of its assignment. It developed a research and development program which, if carried out, would probably establish the reliability and validity of the polygraph as a means of judging deception. We undertook several studies with results which have been summarized above. However, we were not able to undertake our proposed validation studies because of concern with the possibility of severe adverse reaction on the part of Congress, the press, and the public to subjecting recruits to any kind of polygraph examination. (Reference 5) The proposed TV study cannot be undertaken because too few polygraph examinations are being conducted now to permit the collection of the required research data in a reasonable amount of time. Thus, the polygraph remains in use but no steps are being taken to establish its validity.

Here, we wish to point out the significance of what we have learned so far.

The standard polygraph device is not a precision instrument. It can be demonstrated that the instrument responds in a non-linear fashion to increased inputs. Large scale deflections of the recording pens are over-damped, while small scale deflections are under-damped. The instrument is mechanically stable but it shows a drift in the electronic circuits during the first 30 minutes of a warm up period. There is a resonant frequency in the recording system. The response characteristics of the GSR unit differs in the Keeler and Stoelting polygraphs, the two standard instruments.

It is not necessary to accept the demonstrated limitations of the present devices. Information contained in the report of the National Bureau of Standards (Reference 12) and elsewhere can be used to establish improved specifications for the purpose of new polygraphs. The DoD owns about 408 polygraphs. About five new polygraphs are bought each year and a new one costs about $1300.

We also found that some polygraphs in routine use do not even perform in accordance with present specifications, especially in the GSR unit. We suggest that all polygraphs be calibrated with an external standard each time they are used.

We refrain from suggesting that an improved polygraph be developed until two steps are accomplished: (1) when the validity of the present polygraph has been established and (2) when analytical research establishes which physiological parameters should be monitored. An inconvenience posed by our new knowledge about the polygraph is that historical records must be used with caution because we cannot be sure the machines were properly calibrated. If we do not know whether a Keeler or Stoelting was used, we don't know how to interpret the GSR record. It is also important to determine whether different equipment specifications or lack of calibration can significantly influence the validity of polygraph examiners' judgments.

The Joint Services Group was able to formulate but not to carry out a research program to determine the rel..ability and validity of a polygraph examination. The conceptual problems of devising a research strategy were less formidable than the practical ones. It may be helpful to review them.

Reliability, that is, the agreement between several independent examinations, tells us whether our method of measurement yields consistent results. If the agreement between several examinations is low, we know that our method of measurement is not really working and that we need to improve it. If

there is high agreement between parts of a single examination, we know one of these contributes little new information and that it can be eliminated. Surprisingly few studies have been accomplished on the reliability of an entire polygraph examination or of any of its parts such as, for example, the pre-interrogation interview, type and sequence of questions used in the examination, and chart reading. Such studies are rather easy to carry out, provided that appropriate test material can be developed, and they should obviously be undertaken. We demonstrated that TV records would be particularly useful for such purposes, but more funds would be required and it would take a considerable amount of time just to collect the TV records.

The Joint Services Group, for reasons given above, was not able to determine the validity of the polygraph examination. We believed that voluntary polygraph tests on military recruits would constitute a feasible as well as realistic experiment. This would permit us to compare the examiner's judgment as to whether the recruit lied about possible subversive or criminal activities in filling out his Statement of Personal History against the results of a National Agency check. Unfortunately, we were not able to carry out this experiment.

Thus, at the present time, the original goals remain valid but we see no prospect for further progress. That is where the matter rests.

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APPENDIX I

FINANCIAL REPORT ON AFSC PROJECT 4356

Air Force		
Rome Air Development Center (EMICA) Griffis Air Force Base, New York 13440		
Two Digital Recording Polygraphs AF Contract F 30602-67-C-0234 Southwest Research Institute	$52,700.00	
Keeler Polygraph Calibrator, and supplies	1,575.00	
Travel by OSI for reliability study	5,000.00	
(Unexpended)	(25,725.00)	
		$59,275.00
Navy		
Office of Naval Research Washington, D.C.		
MIPR F 30602-67-C-0095 $35,000.00		
Houston State Psychiatric Institute Improved automatic data processing of polygraph responses in criminal investigations.	34,000.00	
(Unexpended)	(1,000.00)	
		34,000.00
Army		
Behavioral Science Research Laboratory Office of the Chief of Research and Development Washington, D.C.		
MIPR F 30602-67-C-0063 $80,000.00		
Travel	56.00	
Supplies for reports	185.00	
50 rolls magnetic tape for polygraph recordings	1,500.00	
(Unexpended - allocated for validity studies at Fort Gordon and Lackland Air Force Base)	($78,259.00)	
		$ 1,741.00
Total Expended		95,016.00
Allocated But Unexpended		104,984.00
		$200,000.00

TECHNICAL REPORT NO. LWL-CR-03B70

COMPARISON OF VOICE ANALYSIS AND POLYGRAPH AS LIE DETECTION PROCEDURES

Final Report
Contract No. DAAD05-72-C-0217

by
Joseph F. Kubis
Fordham University
New York, New York

August 1973

EACH TRANSMITTAL OF THIS DOCUMENT OUTSIDE THE AGENCIES OF THE U. S. GOVERNMENT MUST HAVE PRIOR APPROVAL OF THE COMMANDING OFFICER, USALWL.

U. S. ARMY LAND WARFARE LABORATORY
Aberdeen Proving Ground, Maryland 21005

The findings in this report are not to be considered as an official Department of the Army position, unless so designated by other authorized documents.

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SYNOPSIS

Two voice-analysis techniques were evaluated as lie detection devices in a simulated theft experiment which utilized 174 subjects. One group of subjects (n = 137) was examined with the polygraph at the same time as voice recordings were taken. A smaller group (n = 37) was tested only with voice recordings. Both groups of subjects consisted of male and female university students.

The results failed to demonstrate that either of the voice-analysis techniques was effective in identifying the three basic roles (Thief, Lookout, Innocent Suspect) of the simulated theft. In contrast, the polygraph achieved an accuracy score of 76 percent, a value comparable to that obtained in previous studies using the simulated theft paradigm. Independent raters, who knew nothing about the characteristics of the persons examined, also obtained significantly high accuracy scores in the examination of the polygraph charts (50 - 60 percent).

Although the overall results obtained from voice recordings were not statistically significant, lower voice-accuracy was obtained with polygraph-tested subjects than with those who were examined without the polygraph.

A subsidiary result concerns the ratings of tape monitors who were present during all interrogation sessions. Basing their judgments only on their immediate global impressions, they were able to discriminate between the thief, lookout, and innocent suspect with a significant degree of accuracy. This capability together with the highly significant accuracy scores of the polygraph examiners, demonstrate that the simulated theft procedure is valid for lie detection research, in that it induces in subjects a sufficient degree of emotional responsiveness and involvement to enable the polygraph examiners and tape monitors to differentiate among the three basic roles of the simulated theft situation.

The failure of the voice-analysis techniques to detect these differences cannot, then, be attributed to insufficient emotionality in the subjects. Rather it would seem to be a matter of insensitivity or other inadequacy in the devices themselves in their present state of development.

ACKNOWLEDGMENTS

It is a pleasure to acknowledge the help and cooperation of the many friends and colleagues who have contributed to the success of this research effort. Through all phases of the complex requirements and demanding tasks, the project was fortunate to have William J. Krossner as the prime coordinator who kept things moving swiftly and efficiently. He also served as a polygraph operator along with Rudolph Eckhardt, Sharon Bolub, and Mary James. Their competence in all phases of the polygraph examinations assured the validity of the basic data.

The work demands made upon Kathy Guta, Nancy Kochanowicz, Rose-Marie Monserrate, Joan Nissen, Mary O'Hara, Rhonda Parrella, Joseph Pastore, and Phyllis Topol were always responded to with efficiency and enthusiasm. In particular, Rhonda Parrella was always available whenever a workload was encountered.

The project was also fortunate in having Gordon Barland and Thomas McShane serve in a consultant capacity. Their acknowledged skills applied to a highly frustrating situation added a high order of professionalism to the research effort. The final revision of the written report benefited immeasurably from the keen observations and felicitous phrasing of Mary Carol Cahill.

Many of the stresses associated with the research project were cheerfully assumed by Harold Rosen of the LWL whose understanding, cooperation, and patience finally led us through the completion of this work.

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CHAPTER 1. OBJECTIVES AND BACKGROUND

The present research had two objectives: to evaluate the capability of voice analysis as a lie detection technique and to compare the efficiency of two such devices with that of the polygraph. To achieve these objectives, the "simulated theft" paradigm, developed by the author in previous research (Kubis, 1962), was adapted to the needs of the present experiment. Before beginning a description of this experiment, a brief review of the underlying rationale of lie detection procedures will be presented to provide a meaningful background for the proper evaluation of this research.

EMOTIONAL EXPRESSION

The basic characteristic of an emotional reaction is its widespread and diffuse aspect. All parts of the body are involved, internal as well as external. The hormonal responses to an emotional situation rapidly induce a variety of physiological perturbations among which blood pressure, respiration, and the psychogalvanic response have attained popularity as lie detection indices. While the use of these systems is sometimes identified with the specific area of lie detection, the physiological outputs are actually quite general, and have been accepted as valid expressions of an entire gamut of emotional responses. The particular problem in lie detection, which is still not completely resolved, is the proper identification of the emotional components associated with lying.

As for external expression, all parts of the body have long been known to participate in and reflect various emotional experiences. The body shows emotion in the face, voice, hands, legs, and body posture; and in their complex dynamic interactions. Since these body expressions serve as signs and signals, they have recently been studied in the light of communication theory. Essentially, the body expressions are seen as nonverbal communications. Both momentary feeling states and longer lasting emotional attitudes, reflected in the external expressions of the body, can be viewed as messages to be decoded by an empathic observer. Mehrabian (1972) states that "Any behavior that is observable can serve as an outlet for feeling and is thus, in principle, communicative" (p. 179). Basing his conclusions on observations of psychiatric patients, Deutsch (1947) states:

> The correlation of psychological (verbal) with postural expression shows, that in states of instinctual conflict, the defenses and the repressed emotions are readily reflected in bodily behavior (p. 211).

"Body language," it would seem, is perfectly general, applicable to normal and patient populations.

Behavioral responses expressive of emotional states are, then, divided into two classes: those external and directly visible (or audible), such as changes in facial pattern, hand position, posture, rate of speech; and those internal and not directly accessible, such as physiological responses and mental attitudes. With sources as varied as these the problem of inconsistent messages is a serious one for investigators to unravel. Of specific relevance to this discussion is any inconsistency between verbal response and internal belief which is deliberately contrived by the speaker. This is the problem of lying; and its possible detection depends on the patterning of internal and external behavior induced by the discrepancy of subjective knowledge and its verbal expression.

From among the wealth of expressive indicators, several distinct combinations have been proposed as possible lie detection criteria. The physiological indices, such as blood pressure, respiration, and the psychogalvanic response, have been studied experimentally and used practically in criminal and civil investigations. This literature is extensive and easily available. Two more recent proposals for lie detection involve nonverbal behavior and voice analysis. These deserve separate treatment.

NONVERBAL INDICES OF LYING

It is safe to assume that most adults have observed others in evasive situations, such as consciously trying to deceive or mislead. In general, too, most have learned how to interpret the behaviors associated with such evasive tactics. As a result of these experiences, most people feel that they can often tell whether a person is lying or telling the truth merely by observing his nonverbal behavior.

It would seem that "nonverbal behavior may escape efforts to deceive, may evade self-censoring, or may betray dissimulation" (Ekman and Friesen, 1969, p. 88). With this general hypothesis, Ekman and Friesen explored the capability of different parts of the body to send deception clues. They assumed that the face had the greatest "sending capacity"; the legs and feet, the poorest. As sources of leakage and deception clues, the legs were best, the face the poorest. They used only one subject, a hospitalized psychiatric patient whom they photographed in an interview in which she tried to conceal how upset she was. This film was shown to two groups of observers: one group was shown the face and head, the other saw only the neck and body. The observers were to describe the feelings of the patient. The results were inconclusive since the hypothesis, that differential messages would be sent by these two general areas of the body, was not verified.

In an extensive series of experiments, Mehrabian (1971) also explored various nonverbal behaviors that could betray the true feelings of individuals. Most of the situations required subjects to make verbal presentations to a

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judge on issues they strongly approved or strongly disapproved. They were to maintain or create an impression of truth-telling in some situations; in others, they were to create an impression of lying. In the first two experiments, the subjects were viewed through a one-way mirror by observers who scored various aspects of the behavior, such as body position, movements of body members, facial expressions, verbalizations, and vocal activity. In the third experiment the subjects' behavior and speech were videotaped without their knowledge and later rated on the same behavioral characteristics. The results demonstrated that:

> ...when being deceitful communicators nodded and gestured less, exhibited less frequent leg and foot movements, assumed less immediate positions relative to their addresses, talked less, talked slower, had more speech errors, and smiled more (Mehrabian, 1972, p. 103).

As previously indicated, experimental interest in this field is rather recent, while folk-lore and common experience have always acknowledged that concealed information must find an outlet in bodily expression. This "common-sense" knowledge has long been accepted as axiomatic among criminal investigators. The careful search for bodily clues of deception during preliminary interviews with the suspect is strongly advocated by Reid and Inbau (1966) in their text Truth and Deception. Various criteria by which to distinguish truth-telling from lying are also advocated. As an example:

> A truth-telling person will not be upset by the suggestion of fingerprint, or footprint implications, whereas a liar will probably manifest considerable concern by such reactions as a delay in his answer, by looking away from the examiner, or by squirming around in the chair (1966, p. 14).

Whether he is aware of them or not, the polygraph operator will always be exposed to the nonverbal communications of the person he is interviewing or interrogating. The important issue is the determination of how much the nonverbal behavior is being utilized in the final decision process. If the polygraph operator is also the person who does the pre-test interviewing (and in most instances this is the case) how much of his final decision has already been determined before the polygraph examination has actually begun? It should be obvious that research in this area is urgently needed.

VOICE CHARACTERISTICS DURING DECEPTION

Voice-Emotion-Stress

Studies of, and training in, the vocal and temporal parameters of speech have always been considered the province of rhetoric and drama. This area has been rather neglected by psychologists whose research has focused more on personality and emotion as related to differences in vocal

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expression. Even here, results have been somewhat disappointing. Myers and Merluzzi (1971) report in a recent review that relationships between specific emotions and definite vocal patterns have neither been clear nor consistent. Recently, the development of voice spectrum analysis has opened up a new and intriguing technique for the study of these relationships, and the search for vocal characteristics that would have wide application still continues. At the present time,

> ...progress is being made in relating complex physical characteristics of speech to emotions and emotional stress. The primary problems are intersubject and intrasubject variability; thus, using only physical characteristics of speech as a determination of emotions or stress is still unreliable (Myers and Merluzzi, 1971, p. 4).

Much of the work in analyzing the speech spectrum in order to discriminate among emotional states has been initiated by Russian scientists. Some of the earliest research in spectrum analysis was developed in conjunction with the Russian space program, because of the expectation that this procedure would prove valuable in assessing degrees of stress in cosmonauts. The early interest of Russian scientists in the particularly intriguing problem of discriminating positive and negative emotions continues to the present (Popov et al., 1971).

Voice Analysis as a Lie Detection Technique

Myers and Merluzzi (1971) report only two studies in which judges attempted to detect lying solely by listening to the voices of speakers. In one report, the voices were presented over a public address system; in the other, they were on tape. In neither experiment was there a significant degree of correct identification of lying.

The electronic analysis of the speech spectrum might prove to be more diagnostic than ordinary signal acquisition and analysis by the human ear. Such electronic analysis is certainly more reliable and more objective, as it focuses exclusively on the physical characteristics of the sound. At the present time, two different instruments have been devised to explore this area, and though both make claims to measure "stress" or "psychological stress," their primary use seems to be directed at lie detection.

In the case of the Dektor Psychological Stress Evaluator, no experimental data have been made available. Publicity in the popular magazines, however, claims validity for the Dektor technique in criminal and non-criminal situations.

The second instrument, manufactured by Decision Control Incorporated, was "evaluated" by comparison with the polygraph in a study on three subjects. In a complex and lengthy report, Decision Control Incorporated,

concluded: "The results of this study indicate that voice analysis provides results comparable to polygraph evaluations" (1971, p. 14). The nature of the report and the data presented make this conclusion difficult to verify; in any case the conclusion overshoots the data in that only three subjects were examined.

Before any such voice-spectrum instruments can expect to be accepted as valid, several requirements must be met by their manufacturers. Equipment developers must define more precisely what they mean by "stress," and must calibrate the physical output against known degree of "stress." In addition, they must establish that the "stress" their machines measure is identified with whatever "stress" it is that permeates the lying response. Here again, a great deal of research remains to be done.

CHAPTER 2. PROCEDURE

As indicated earlier, the experiment was structured around a simulated theft. The subject acting as Thief had an accomplice, a Lookout; and both were interrogated immediately after the "crime." Serving as a control and completing the experimental triad, an Innocent Suspect was also interrogated about the theft. He neither knew nor saw the "culprits"; neither did he know what was stolen, nor how the theft was committed. Voice recordings were made of the interrogation procedure.

Interrogation was conducted under two modes: polygraph plus tape recording; and tape recordings of voice only. In the latter mode there was no change in overall procedure of the experiment, except in this, that when the subject was interrogated, the polygraph apparatus was not attached to him. In this way, the physical stress and annoyance occasioned by the polygraph attachments were avoided.

Since the tape recordings made of subjects' voices were later to be analyzed by each of the presently-available instruments (Psychological Stress Evaluator and Voice Stress Analyzer) it was desirable to be able to evaluate the accuracy of these voice-analysis procedures in both polygraph and non-polygraph situations. In the latter case, the possible effect on vocal responsivity of intrusive anxiety created by the inflated cuff could be avoided. On the other hand, the former case (polygraph attached) corresponds more closely to the actual experience of subjects interrogated with the polygraph. And it is against the established records of detectability of polygraph subjects that the voice-analytic detection successes were to be compared. Approximately 20 percent of the voice recordings were obtained under the voice-only (no polygraph) condition.

The examination involved a polygraph operator (Examiner) and a Tape Recording Monitor. The function of the Tape Monitor was to control the volume input of the subject's voice in order to optimize the adequacy of the tape recording. After each triad was examined, the Examiner and the Tape Monitor independently recorded their immediate impressions as to the actual roles played by the subjects. In the case of the Tape Monitor this judgment was based on the general behavior of the subject, his general comments, and on the character of his vocal responses. The polygraph operators may be presumed to have used the same indices; for they said that their immediate global judgments were not too much influenced by the actual chart recordings being made. The operators felt they were much too busy with the technical details of operation to take serious note at the time of any subtle correlations among the various responses. In any case, the formal analysis of the polygraph records was made by the Examiner about two weeks after the examination. His task was to determine who was the Thief, the Lookout, and the Innocent Suspect in each experimental triad. Complete details of this procedure are described in the following sections.

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THE SIMULATED THEFT

Students were recruited as subjects by means of posted notices and by ads placed in the school newspaper. Once they indicated their willingness to participate in an "experiment," they were arbitrarily arranged in groups of three and given an appointment for the experiment. Because the subjects rarely arrived at exactly the same time, the Supervisor of the experiment was able to put one subject in one room and the other two in a separate room without the former seeing the latter. In almost all cases the three subjects did not know each other.

Once in the room the subjects were asked to fill out a form which requested census-type information. They were also asked to sign a pledge not to talk with anyone about this experiment for a period of a year. The census-type information enabled the Examiner to choose the appropriate questions for his interrogation.

The Supervisor then instructed the two individuals who were together as to the roles they were to assume. By drawing lots, one assumed the role of Thief, the other the role of Lookout. The Thief was to enter what he believed to be the unoccupied office of a female professor, open her handbag which was on the desk, examine the contents of the bag, and remove only the contents of the change-purse which was in the bag. The purse contained 21 dollars in bills wrapped around by a red ribbon.

The Thief's associate was to act as a Lookout, making sure that no one was around while the Thief entered and left the "professor's office." Since there were other offices nearby, and a students' activities room within 15 feet of the locus of the theft, the Lookout had an important and anxiety-provoking role in view of the uncertainties of students' and professors' whereabouts.

Although Thief and Lookout arrived near the professor's office together, they left the scene of the crime at different times so as not to attract attention or suspicion. Upon completion of his task, the Thief signalled the Lookout who immediately returned to the laboratory. In turn the Thief left the scene of the crime, examined what he had taken from the purse, hid it on his person, and then returned to the laboratory. The two accomplices were instructed not to talk to each other after the Theft was committed. As a result, the Lookout did not know what was stolen. While Thief and Lookout were waiting to be examined, the Supervisor made certain that no conversations were initiated between them.

Before being examined, the Innocent Suspect, who neither knew what happened nor who was involved, was given general instructions that there had "been a theft of some money in one of the faculty offices." He was advised that since he was not involved, he had no cause for worry. All that was required was that he answer the questions truthfully. (The Thief and the Lookout had already been instructed to deny all aspects of the theft, namely, the planning, participation, and execution.)

Within each triad, subjects were examined in a random order.

THE EXAMINATION

Most of the examinations involved the use of a polygraph and a tape recorder with a lavalier microphone. The subject was seated in front and to the side of the polygraph, which was thus placed to minimize its peripheral visibility to the subject during the testing. The Examiner was to the left and behind the apparatus while the Tape Monitor was more or less directly behind the subject. Both Examiner and Tape Monitor were unaware of the role each subject had played in the experiment.

The examination consisted of three parts: Interrogation with Questionnaire, Modified Peak of Tension Test, and an Association Test. Each of these is described below.

Questionnaire

After the pneumograph bellows, the lavalier microphone, the PGR electrodes, and the blood-pressure cuff were attached, the subject was instructed to give a "Yes" or "No" answer to each of 30 questions included in the Questionnaire (cf. Appendix). To prevent excessive discomfort, the questionnaire was divided into four approximately equal parts, after each of which the pressure in the cuff was released and the subject given a brief rest.

Three types of questions were contained in the questionnaire: matter-of-fact questions, emotional standards, and critical questions. As a designation suggests, the critical questions were directly related to the theft. There were four of them, each repeated once, thus providing a total of eight critical questions. The critical questions were:

Were you an accomplice to the thief?
Did you plan this robbery with someone else?
Do you know who stole the money from Room 450?
Do you have the stolen money with you?

Preceding each of these were emotional standard questions. These involved matters of a personal or family nature. In previous research they had been found to produce a moderate emotional reaction. These, too, were repeated; but no emotional standard preceded the same critical question more than once. Examples of these are:

Do you have any brothers? sisters?
Are you married? single?
Have you served in the armed forces?
Have you ever been arrested?

Interspersed throughout the remainder of the questionnaire were the matter-of-fact or census-type questions, such as:

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Are you a Law School student?
Do you live in a one family house? an apartment?
Do you own a motorcycle? car?
Do you live in Brooklyn? Staten Island?

Of the matter-of-fact questions, only those which followed a critical question were so structured as to elicit a "No" response. All emotional standards also elicited a "No" response. The purpose was to guarantee a constant verbal evocation for these three questions. Only with this precaution could valid comparisons be made among ratios of emotional standards to critical, and among ratios of matter-of-fact to critical. In other words, every triad of questions with critical question at center was answered by a "No." All other matter-of-fact questions, those preceding or following these triads, were answerable by "Yes." These "Yes" responses provided a change in response attitude and made the questioning seem quite natural to the subject.

Peak of Tension Test

Upon completion of the questionnaire, the Examiner instructed the subject to say "No" to each of the following numbers (which represented dollars):

15 17 19 21 23 25

As may be observed, the series is calculated to induce a build-up of tension toward the critical number 21, the amount stolen. Following the critical number, one would expect a decrease of tension, since the subsequent numbers are irrelevant to the Thief. As for the Lookout and Innocent Suspect, no such regular rise and fall of tension was expected, since neither knew what amount had been stolen.

Association Test

The final test procedure included two lists of words used as association tests. These lists follow.

1) APPLE EAGLE HANDBAG PENCIL TABLE LOOKOUT ROADSIDE

2) WINDOW WARLIKE RIBBON SPRINGTIME OCEAN

The underlined words have direct reference to the theft. Those in the first list involve the Thief and the Lookout. The word RIBBON in the second list could have meaning only to the Thief.

The Peak of Tension and Association procedures comprised approximately 40 percent of testing time. They were used to provide additional criteria for the differentiation of the Thief and Lookout, a matter to which the questionnaire devoted only 25 percent of testing time (two of eight critical questions).

POST EXAMINATION AND DEBRIEFING

When the three test procedures had been completed, the Examiner instructed the subject to return to the Supervisor. After the last subject of a triad was examined, the Examiner and Tape Monitor, each working independently, recorded their impression as to who was the Thief, who the Lookout, and who the Innocent Suspect. This procedure provided a basis for evaluating the ability of the Tape Monitor to size up suspects merely on the basis of their behavior and voice characteristics. The Examiner potentially had an additional source of information -- the polygraph record. However, as mentioned earlier, the Examiners felt that, in view of the continuing attention to mechanical details, position of next question to be asked, etc., very little immediate record interpretation was possible. As a result they considered their impressions of the person's behavior before, during, and immediately after the examination to be significant factors in their identification of the role each subject assumed in the experiment. Contrast between the success ratios of Tape Monitors and Examiners in these immediate global judgments if found, might suggest in fact, that the Examiners had made some use of the chart information available to them.

Meanwhile the subject who completed the examination was being debriefed by the Supervisor. He was also asked to rate his emotional reactions during each phase of the theft (Thief and Lookout) and during the interrogation itself (all members of triad).

One month following the completion of the experiment, all subjects were contacted for the drawing of prizes. This fulfilled the promise made during recruitment and during the initial instructions by the Supervisor.

Contacts with subjects tended to confirm the belief that no subject talked about the experiment before it was completed. Cooperation of subjects seemed particularly good in this matter.

PHYSICAL FACILITES AND INSTRUMENTATION

Physical Facilities

The experimental facilities included a suite of three adjacent rooms one of which was used for interrogating the subjects. The other two rooms were used to accommodate the subjects before and after the examination period. They were furnished with tables and chairs, and served as waiting and instruction rooms. The examining room contained the polygraph and recording instruments.

The room from which the money was stolen was one floor above, and at the opposite end of the corridor. Prior to its use for this project, it had been a testing room, though no different from others which were being used as offices by faculty. It was arranged to look like a faculty office, with books and reading material spread about on the desk. With the handbag on the desk, it appeared that the faculty member had just stepped out for a moment.

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Instrumentation

Two traditional field polygraphs (Stoelting) were available for use throughout the experiment. The one which provided the basic data was a compact Md 1 Executive. A Stoelting Deceptograph which was used for training the Examiners was always on hand for backup purposes.

A high quality recorder, Uher 4000 Report L, was used to record the interrogation sessions. Tape speed was 7-1/2 inches per second. A lavalier microphone was also used. In the early phase of the experiment, the microphone was generally placed on the table next to the subject. During the latter part it was uniformly placed over the neck of the subject and rested comfortably on his chest.

A preliminary model of the Voice Stress Analyzer was used in the evaluation of the voice records. The instrument, produced by Decision Control Inc., extracts speech energies in two frequency bands, 100 to 120 hertz, and 500 to 800 hertz; and forms the ratio of the corresponding energies. This ratio is assumed to change with variation in stress. The instrument presents a visual record on paper tape of energy ratios extracted from a given speech signal. In the present research the speech signal was the word "No." The peak amplitude of the energy ratio is the value used to assess the degree of stress, and thus the degree of involvement in the simulated theft.

The Dektor Psychological Stress Evaluator was also used to analyze the same tape recordings obtained in the simulated theft. A brief account of its use has been provided by George F. Cake Co. in a page of advertising copy. An excerpt from this description follows.

> It makes use of specific voice qualities which reflect visually or aurally undetectable changes resulting from small changes in the degree of psychological stress... Either "yes" or "no" answers, narrative answers, or conversational utterances may be used to accomplish the evaluation ... the voice frequencies employed are well within the 300 to 3,000 Hertz frequency band. (Advertising copy, George F. Cake Co.)

There are several levels or modes of analysis, and the first of these is analogous to that obtained with the Voice Stress Analyzer. Additional modes involve a sophisticated visual evaluation of frequency patterns. Expertise in these procedures requires extensive training. In this present experiment all analyses performed on the Psychological Stress Evaluator were done by an expert who had been trained at Dektor.

SUBJECTS

All subjects were students at Fordham University. The majority ranged from 18 to 25 years of age; only three were younger than 18 and eight older than 25. The sample included 116 men and 58 women.

There were 57 complete triads. Of these 45 involved both the polygraph and tape recorder; 12 triads used the tape recorder alone during the interrogation. An additional classification of the triads showed that 18 were female in composition, 36 were male, and 3 were mixed. Of these 2 of the female, 7 of the male, and the 3 mixed triads were interrogated by the non-polygraph procedure.

As expected, a number of difficulties arose during the execution of the experiment. In triad 5, one subject confessed. Triad 39 was eliminated because of a strong suspicion that the subjects had previous knowledge of the details of the experiment. Triad 40 was also discarded because of non-responsivity, possibly due to mechanical difficulties. Several other triads contained poor records in one or another component. These records were not discarded whenever two of the other components generated adequate tracings.

EXAMINERS AND RATERS

Four Examiners were used. During the course of each simulated theft, one of the Examiners served as polygraph operator while another assumed the role of Supervisor for that experimental triad. Usually these roles were reversed when several triads were available.

All four Examiners had graduate degrees -- two had Ph.D. and two, M.A. degrees. Two were male and two were female. All were psychologists with a strong background in the physiological bases of emotional responsiveness. Before beginning the experiment, they were given a short course in polygraph operation by an acknowledged expert in the field from another institution.

After completing the interrogation of an experimental triad, the Examiner filed the polygraph charts for a period of approximately two weeks, to allow specific memories of any session to fade before he started his formal analysis of the records. He rated the polygraph responses from all three components of the interrogations and then gave his decision as to the role of each member of the triad. This was done for each triad separately. For ready reference, this rating procedure will be called "Triad Analysis." This is to be contrasted with "Individual Analysis" wherein each individual record, isolated from its triad, is judged on its own merits. In the Triad Analysis, the rater has all three records of a triad for comparison, and should he be correct in two of the judgments, he would necessarily be correct in his judgment of the third record even though he never looked at it. In the Individual Analysis, the rater made his judgment of subject involvement (Thief, or Lookout, or Innocent Suspect) only on the basis of the tracings in that record alone. There were

no clues from the previous or subsequent record since these belonged to different triads.

While Triad Analysis was done by the four Examiners, the Individual Analysis of polygraph records was reversed for two other experienced polygraph operators. With these data, then, both types of comparison were made: accuracy of polygraph and voice ratings under Individual Analysis; and accuracy of polygraph and voice ratings under Triad Analysis.

CHAPTER 3. RESULTS

. Despite the complexity of the procedures and analyses, the results can be readily classified into several interrelated categories. The first section will deal with the polygraph results: the accuracy of judgment in Examiner and rater, and the detectability of lying in male and female subjects. In a sense this introductory evaluation has to do with the validity of the experimental procedure. If the polygraph operator could not detect emotional variation in the responses of different role-playing subjects, there would be some doubt as to the adequacy of the polygraph as a criterion against which to test the validity of the voice analyzers as lie detection devices.

The second section will analyze the immediate global judgments of Examiners and Tape Monitors. These results should provide evidence as to whether behavior is a nonverbal communicator of the internal attitudes and feelings of the suspect and whether ordinary people can decode these messages with better than chance accuracy. The results provided in this section can also be used to validate the experimental procedure in that they may provide evidence that the experimental procedure does in fact induce specific behaviors in the suspect which reflect his guilty or innocent frame of mind.

In the third section the evaluation of the Psychological Stress Evaluator as a lie detector will be done under both analytic modes -- Individual and Triad Analysis. Further, the accuracy of the Psychological Stress Evaluator will be determined when used with the polygraph and when used alone. This comparison should indicate whether the stress induced by the polygraph attachments affects the adequacy of the voice records for lie detection purposes.

The final section will present the statistical analysis of the peak responses of the Voice Stress Analyzer (VSA) to the critical questions during the interrogation. Since no specific criteria for detecting deception have been provided by the VSA research manual, the procedure adopted was to make an analysis of the VSA responses for each of the eight critical questions, taken separately for each triad. Within each triad, the responses were ranked for each of the questions. The sum of the ranks for each experimental role (Thief, Lookout, Innocent Suspect) could thus be used to indicate whether there was differential voice responsivity among subjects assuming each of the three roles.

POLYGRAPH RESULTS

Examiner Judgments

Since the polygraph was used as the basic instrument against which the voice analyses were to be compared, the results obtained from its use

bear careful scrutiny. Table 1 presents the accuracy data for male and female subjects and for the combined results. The matrices of Table 1 permit the comparison of Examiner judgment, using Triad Analysis, against the actual status (role) for each group of subjects. Within the male group, for example, of the 29 subjects who played the role of Thief, 25 were judged to be thieves by the Examiners. The four errors were divided equally among Lookouts and Innocent Suspects. Of the 29 Lookouts, 24 were judged as such by the Examiners. Four of the errors were judged as Innocent Suspects and one was rated as Thief. Overall Examiner accuracy with male subjects was 83 percent.

With female subjects, Examiner accuracy attained a 65 percent level. This percent of correct identification is considerably lower than the 83 percent obtained for male subjects. The reason for this difference is not readily apparent.

Using the combined data for all subjects, Examiner accuracy becomes 76 percent. In other words, three out of four suspects were identified correctly.

The results obtained for each of the matrices in Table 1 are very highly significant from a statistical point of view. The chi-square values are of the order of 96, 21, and 112 for male, female, and combined results respectively. These values are so large that they are not even included in the usual statistical tables. As a basis for comparison, the tabled value at the .05 level of significance is 3.84.

There is no doubt, then that the polygraph is used very effectively by the Examiner, yielding results that far exceed chance expectation. In turn, this implies that the experimental procedure does induce sufficient emotional arousal in the "guilty" subjects (Thief and Lookout) to enable them to be differentiated from the Innocent Suspect. Further, the procedure is sufficiently precise as to enable the Examiner reliably to distinguish the responses of the Lookout from those of the Thief.

Rater Judgments (Individual Analysis)

This section presents the results obtained by the two experienced polygraph operators who evaluated all polygraph records on an individual basis (Individual Analysis). The raters used different evaluative procedures, and it was anticipated that one of them (B) would attain a higher degree of accuracy because the procedure he used involved optimal exposure to the individual components of the polygraph records.* The results are presented in Tables 2 and 3.

*Rater B evaluated and rated each physiological component of the polygraph chart separately and independently and made a role decision for each subject based on that component. After completing this procedure, he then made a role decision for each subject based on the total polygraph chart. Table 3 is based on the total chart. Rater A considered the total chart only.

TABLE 1. Accuracy of Examiner Judgments

Male Subjects (29 Triads)

		ACTUAL STATUS		
		Thief	Lookout	Innocent
EXAMINER RATINGS	Thief	25	1	3
	Lookout	2	24	3
	Innocent	2	4	23

(% correct: 72/87 = 83%)

Female Subjects (16 Triads)

		Thief	Lookout	Innocent
EXAMINER RATINGS	Thief	9	5	2
	Lookout	6	9	1
	Innocent	1	2	13

(% correct: 31/48 = 65%)

All Subjects (45 Triads)

		Thief	Lookout	Innocent
EXAMINER RATINGS	Thief	34	6	5
	Lookout	8	33	4
	Innocent	3	6	36

(% correct: 103/135 = 76%)

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TABLE 2. Accuracy of Rater A in Judging Experimental Roles from Polygraph Records (Individual Analysis)

Male Subjects

		Thief	Lookout	Innocent
RATER DECISION	Thief	13	2	8
	Lookout	6	13	6
	Innocent	9	11	18

(% correct: 44/86 = 51%) Chi-square = 12.31

Female Subjects

		Thief	Lookout	Innocent
RATER DECISION	Thief	6	4	1
	Lookout	6	7	1
	Innocent	4	6	11

(% correct: 24/46 = 52%) Chi-square = 7.35

Male and Female Subjects

		Thief	Lookout	Innocent
RATER DECISION	Thief	19	6	9
	Lookout	12	20	7
	Innocent	13	17	29

(% correct: 68/132 = 52%) Chi-square = 19.64

TABLE 3. Accuracy of Rater B in Judging Experimental Roles from Polygraph Records (Individual Analysis)

Male Subjects

		Thief	Lookout	Innocent
RATER DECISION	Thief	18	2	2
	Lookout	6	12	5
	Innocent	5	14	20

(% correct: 50/85 = 59%) Chi-square = 24.85

Female Subjects

		Thief	Lookout	Innocent
RATER DECISION	Thief	10	1	0
	Lookout	3	10	6
	Innocent	3	4	11

(% correct: 31/47 = 66%) Chi-square = 22.51

Male and Female Subjects

		Thief	Lookout	Innocent
RATER DECISION	Thief	28	3	2
	Lookout	9	22	11
	Innocent	8	18	31

(% correct: 81/132 = 61%) Chi-square = 46.67

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Table 2 presents the results for Rater A. The outstanding features are: (1) Individual Analysis yields accuracies that are substantially lower than those obtained by the Examiners who utilized Triad Analysis; (2) though lower than Examiner accuracy, Rater A's percentages are highly significant; (3) Rater A is equally accurate in judging male or female records; (4) finally, as expected, judgments under Individual Analysis "tend towards innocence," that is, more innocent diagnoses are made than any other.

The results for Rater B in Table 3 exhibit a similar pattern. They confirm those found in Table 2, and reemphasize the fact that for these raters, using Individual Analysis, the records of female subjects are no more difficult to evaluate than records of male subjects. This contrasts with the results obtained by Examiners using Triad Analysis. As for the comparison between Raters A and B, it would seem that since both raters are equally competent, the procedure used by Rater B increased discriminability within the polygraph records and produced more accurate decisions.

The results of this section demonstrate that expert raters, working within the more demanding constraints of Individual Analysis, can with a significant degree of accuracy identify the role each subject played in the experiment. Neither of the raters were Examiners, and had no information about the subjects whose charts they had to evaluate. Nevertheless, their accuracy ranges between 50 - 60 percent, whereas only 33 percent is expected by chance. The basic inference is that the experiment did produce sufficient and differential emotional responsivity to enable the raters to identify the separate roles undertaken by the subjects in the experiment.

(Working afterwards under the conditions of Triad Analysis, Rater B obtained a total accuracy score of 77 percent, which is almost identical to the 76 percent obtained in Table 1 by the Examiners, who, of course, had also employed Triad Analysis.)

IMMEDIATE GLOBAL JUDGMENT

As mentioned above, both Examiner and Tape Monitor, working independently, had recorded their decisions as to the status of each member in a triad immediately upon the completion of its interrogation. From the nature of the case, the procedure involved Triad Analysis. The accuracy for these global impressions may be found in Table 4. The chi-square values corresponding to the percentages listed in Table 4 may be found in Table 5.

Taken together, the tables demonstrate that the immediate global judgments of Examiners and Tape Monitors are accurate to a significantly high degree. However, the overall accuracy of Examiners is higher than that of Tape Monitors. This would support the hypothesis, advanced above, that Examiners do in fact pick up important clues from the polygraph records during the examination, despite their assertions that attention to the mechanical aspects of the test procedure precluded any careful in-process analysis of responses.

TABLE 4. Per Cent Accuracy of Examiners and Tape Monitors in their Immediate Global Judgments of Subject Status

	Male Ss		Female Ss		Combined	
	n	%	n	%	n	%
Examiners	105	61	45	73	150	65
Tape Monitors	90	48	39	72	129	55

TABLE 5. Chi-square Values* Corresponding to Per Cent Accuracy Data in Table 4.

	Male Ss	Female Ss	Combined
Examiners	36.04	32.40	66.27
Tape Monitors	7.45	25.96	18.23

* .01 level of significance, 6.64

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Of great importance for lie detection theory and practice are the results obtained by the Tape Monitors. They had no access to the polygraph charts. The only bases for their judgments were the general behavior and verbal comments of the subjects, and the vocal characteristics of the subjects' responses to the questions. Apparently these behaviors of subjects provided relevant clues to their true mental attitudes -- and this despite the subjects' attempts to appear non-committal and non-revealing.

One additional comment is in order. The accuracy of the Tape Monitors in detecting subjects' experimental roles implies that the experiment induced a sufficient degree of emotional responsiveness in the role-playing subjects to make them differentiable on the basis of their behavior. This provides additional evidence for the validity of the experimental procedure.

PSYCHOLOGICAL STRESS EVALUATOR (PSE)

The tape recordings were analyzed separately by an expert polygraph operator who was also qualified as a PSE analyst by Dektor. These tapes were evaluated under both analytic modes, Individual and Triad Analysis. In the analyses presented in this section, subjects were divided into those who were examined with the polygraph and those who were interrogated without it.

Individual Analysis

The accuracy of the PSE operator working with individual records is presented in Table 6. As the results indicate, the percent accuracy remains very close to the chance value of 33. In other words, the tape recordings of the voice reveal no basis for discriminating between the Thief, the Lookout, and the Innocent Suspect. Although the accuracy figure is slightly higher for the non-polygraph subjects, the difference is not significant.

An additional comparison was made between the accuracy obtained with the PSE apparatus and that with the polygraph, still utilizing Individual Analysis for both. In evaluating the polygraph records of the same subjects whose voice characteristics were analyzed by the PSE operator, Raters A and B obtained accuracy scores of 58 percent and 61 percent respectively. It is rather clear, then, that the polygraph records of the group of subjects are more discriminable than the voice records which were obtained at the same time. In other words, the interpretations of the physiological responses (polygraph) and the vocal responses to the same questions are not correlated.

Triad Analysis

After completing the Individual Analysis, the PSE operator was supplied with a partial code which grouped subjects by triads. With this information he reanalyzed his records and reassessed the status of each subject within a triad. The results of these decisions are presented in Table 7.

TABLE 6. Accuracy in Judging Experimental Roles by means of the PSE (Individual Analysis)

Polygraph Subjects

		ACTUAL STATUS		
		Thief	Lookout	Innocent
ANALYST RATING	Thief	6	5	8
	Lookout	7	3	2
	Innocent	6	7	5

(% correct: 14/49 = 29%)

Non-Polygraph Subjects

		Thief	Lookout	Innocent
ANALYST RATING	Thief	4	6	4
	Lookout	6	5	4
	Innocent	2	1	4

(% correct: 13/36 = 33%)

Combined Groups

		Thief	Lookout	Innocent
ANALYST RATING	Thief	10	11	12
	Lookout	13	8	6
	Innocent	8	8	9

(% correct: 27/85 = 32%)

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TABLE 7. Accuracy in Judging Experimental Roles by means of the PSE (Triad Analysis)

Polygraph Subjects

		ACTUAL STATUS		
		Thief	Lookout	Innocent
ANALYST RATING	Thief	1	4	4
	Lookout	4	2	3
	Innocent	4	3	2

(% correct: 5/27 = 19%)

Non-Polygraph Subjects

		Thief	Lookout	Innocent
ANALYST RATING	Thief	6	5	1
	Lookout	4	5	3
	Innocent	2	2	8

(% correct: 19/36 = 53%)

Combined Groups

		Thief	Lookout	Innocent
ANALYST RATING	Thief	7	9	5
	Lookout	8	7	6
	Innocent	6	5	10

(% correct: 24/63 = 38%)

Even with the triad-coding information, the PSE analyst did less well than chance with the polygraph-tested subjects. However, the feature of particular interest in the table is the fact that he attained considerably higher accuracy with the non-polygraph subjects. Associated with this higher percentage accuracy (53 percent), is the chi-square value of 6.125 which is significant at the .02 level. It would seem that elimination of the stress associated with the polygraph harness may have provided clearer voice records which, in turn, enabled the operator to discriminate significantly among the experimental roles within a triad. This would seem to suggest that stresses other than those under interrogation can intrude into the voice records and confound the analysis.

If one were to accept the above hypothesis, voice analyses on subjects undergoing a polygraph examination at the same time should produce accuracy figures no greater than chance. (Actually, the accuracy of voice analyses with the PSE was a mere 19 percent where chance expectation is 33 percent. The difference, however, is not significant). From this point of view as well, it seems likely that the stresses associated with polygraph testing may permeate the voice records and make voice analysis less accurate.

Though the hypothesis presented above would appear to be the more likely, another possibly confounding influence may also have been operating. It was mentioned earlier that with polygraph subjects the microphone distance was often greater than the microphone distance in non-polygraph subjects. This distance factor may have had some effect on the tape records. However, the Tape Monitors never observed any differences. Moreover, Individual Analysis (Table 6) shows that accuracy of role indentification is at a chance level for both polygraph and non-polygraph subjects.

Several other comparisons will place the PSE results in better perspective. The nine polygraph triads, evaluated by PSE analysis with accuracy of 19 percent, were also studied by Rater B who attained 78 percent accuracy in his Triad Analysis. The Tape Monitors also made their decisions on eight of the same nine triads, and their accuracy score was 75 percent for the same triads evaluated on the basis of immediate global impression, lower than the raters and monitors, but still more than twice as great as that of the PSE analyst.

A similar comparison can be made with the non-polygraph subjects. The 53 percent accuracy for the PSE operator was surpassed by the 70 percent accuracy for the Examiners in their immediate global impressions (11 of the 12 PSE triads). Similarly, the Tape Monitors obtained 89 percent accuracy in their immediate global judgments for nine of the twelve triads. Thus, all evaluators scored with above average accuracy for these 12 non-polygraph triads.

These comparisons point up two facts. First, in the situation where the PSE operator got no significant results (polygraph subjects), an independent rater and the Tape Monitors obtained at least 75 percent accuracy. Although the Examiners, in their immediate global impressions, scored

relatively low (44 percent) for these triads, this value exceeded the 19 percent obtained by the PSE operator. The second fact refers to the significant PSE result. Even in this case, both the Examiners and Tape Monitors again scored higher in their immediate global judgments. In other words, the PSE analysis yielded either insignificant or dubiously valuable results under the conditions of this simulated experimental theft.

VOICE STRESS ANALYZER (VSA)

Reliability Considerations

Because calibration of each tape with the VSA was a delicate and time-consuming matter, it was decided to determine the reliability of the operational procedure. In the first set of reliability checks, the operator made two runs of the tape on the VSA, keeping the same calibration for both runs. The correlation between corresponding peak magnitudes on both runs was .996. When the same operator recalibrated the system before each run, the correlation coefficient was .871.

The second set of calibration checks involved two operators analyzing the same tape but each making an independent calibration of the system. The correlation coefficient in this case was .940.

The final set of reliability checks involved the peak-measuring procedure, a simple clerical task. Two persons independently measured the peaks on each of three tapes: one from the beginning, one from the middle, and one from the end of the experiment. The correlation coefficients for each set of paired measurements were .999, .985, .987.

These results thus demonstrated a high degree of reliability for all phases of the VSA operational procedure. The delicacy of the calibration operation is indicated by slightly lower coefficients in those situations where the same tape was recalibrated, either by the same individual or by another.

Triad Analysis

The VSA procedure generated a peak value for each vocal response of the subject. These values were listed in a computer printout for each question and so arranged that the members of each experimental triad were grouped together. The data for each subject were then rated by Rater B according to the same format used in the evaluation of blood-pressure, respiration, and psychogalvanic reactions. Once this was done, the patterns of responses were studied, and decisions made as to the roles assumed by the members of the triad. Since the patterns of each member of the triad were available for examination and comparison, the procedure involved Triad Analysis. The results of this analysis are presented in Table 8.

TABLE 8. Accuracy of VSA Procedure under Conditions of Triad Analysis

Polygraph Subjects

		ACTUAL STATUS		
		Thief	Lookout	Innocent
RATER DECISION	Thief	9	11	9
	Lookout	10	10	9
	Innocent	10	8	11

(% accuracy: 30/87 = 34%)

Non-Polygraph Subjects

		Thief	Lookout	Innocent
RATER DECISION	Thief	4	2	1
	Lookout	2	2	3
	Innocent	1	3	3

(% accuracy: 9/21 = 43%)

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The results have been divided into two sections: those for polygraph subjects, and those tested without the polygraph. For neither group is the percent accuracy significantly above the chance value of 33 percent. Although not significant, the trend of the data is similar in one aspect to that observed with the PSE, namely, that accuracy of the voice-analytic technique is greater in the situation where the polygraph is not used.

Critical Questions and Role Differentiation

The Voice Stress Analyzer (VSA) produced a numerical value for each "Yes" or "No" response during the interrogation. These values were not considered as interval scale measures because the variances were not homogeneous for polygraph and non-polygraph subjects. This difference suggested that between-group comparisons might not be valid. At any rate, the ranking of peak measurements within a triad could be justified, and the utilization of such ranks across groups was also a valid procedure.

An example of the procedure may help in understanding the subsequent analysis. Below are the peak scores and their corresponding ranks for all three members of Triad 1 in response to the question, "Were you an accomplice to the thief"?

	Peak Score	Rank
Thief	40	3
Lookout	18	1
Innocent	31	2

These ranks were summed across three sets of 10 polygraph triads for each experimental role. The division of the 30 polygraph triads into three equal subsets was done on a chronological basis, thus making it possible to identify any systematic trends as the experiment progressed. Similarly, the ranks were summed for the seven non-polygraph triads in order to evaluate the effect of the stress induced by the polygraph attachments. The results are summarized in Table 9.

If the VSA apparatus operated without error, the Innocent Suspect would be perfectly identified by his peak score. According to the manufacturer's research manual, the non-stressful (truthful) responses should yield higher values than the stressful (lying) ones. Consequently, the sum of the ranks for Innocent Suspects should be largest among the three roles. Inspection of the "Sum" column in Table 9, which combined the results of the three subgroups, reveals that the value for the Innocent (I) role is not uniformly the largest of the three roles, in the values given for each question.

An equally important result is the absence of a consistent pattern from subgroup to subgroup. For example, the (T) role in Group 1 (in response to the first "Accomplice" question) scored highest; in Group 2,

TABLE 9. Sums of Ranks of Voice Stress Analyzer Outputs for all Questions and all Roles

Question	No.	Role	Polygraph Subjects				Non-Poly Subjects
			Gp. 1	Gp. 2	Gp. 3	Sum	
Were you an accomplice to the thief?	3	T	23.0	15.0	23.5	61.5	13.0
		L	21.5	22.5	15.0	59.0	15.5
		I	15.5	22.5	21.5	59.5	13.5
	14	T	22.0	19.0	16.0	59.0	14.0
		L	19.0	21.0	21.0	61.0	15.0
		I	19.0	20.0	23.0	62.0	13.0
Did you plan this robbery with someone else?	6	T	22.5	20.0	23.0	65.5	19.5*
		L	17.0	19.5	19.0	55.5	14.0
		I	20.5	20.5	18.0	59.0	8.5
	21	T	19.0	18.5	22.0	59.5	13.5
		L	19.5	17.0	20.0	56.5	13.0
		I	21.5	24.5	18.0	64.0	15.5
Do you know who stole the money?	10	T	20.5	20.5	25.0	66.0	16.0
		L	18.5	20.0	15.0	53.5	13.5
		I	21.0	19.5	20.0	60.5	12.5
	25	T	24.0	17.0	17.0	58.0	16.0
		L	15.5	20.5	23.0	59.0	13.0
		I	20.5	22.5	20.0	63.0	13.0
Do you have the stolen money with you?	18	T	25.0*	16.5	20.0	61.5	16.5
		L	14.0	21.0	21.0	56.0	12.0
		I	21.0	22.5	19.0	62.5	13.5
	29	T	25.0	20.0	21.0	66.0	14.5
		L	16.5	19.5	17.5	53.5	14.5
		I	18.5	20.5	21.5	60.5	13.0

* Significant difference among three roles.

it scored lowest. It again scored highest in Group 3. Such wide fluctuation is not the uniform trend one would expect in a valid and reliable instrument.

A minimal expectation is consistency of the same group's responses to the same question. For example, the same question was asked at Q3 and Q14. In comparing the rank sums for these questions, moderate consistency is found among the three rank sums for Groups 1 and 2. In Group 3, however, the (T) score is largest for Q3 while it is lowest for Q14. Even within the "Sum" column, where results should be most reliable, there is only one perfect ordering between the four question pairs, a result in general agreement with chance, where one in six is the expectation.

The above observational comments suggest a lack of discriminative power in the VSA. This was verified in more objective fashion through the statistical evaluation of all the data by means of the Friedman Analysis of Variance by Ranks. The test involved each of the eight critical questions for each of the three polygraph groups and for the non-polygraph subjects. Among the 32 statistical tests, only two produced significant results, namely, Q6 (non-polygraph) and Q18 for Group 1. The absence of consistency in the patterning of these sums, between subgroups and between repetitions of the same question, suggests that the two significant results need no special explanation other than the chance hypothesis.

The results of both sets of analyses presented in this section provide no evidence for the valid use of the VSA as a lie detector. The present experiment did generate sufficient emotional responsiveness in the subjects to enable the polygraph operators to successfully discriminate among the Thief, the Lookout, and the Innocent Suspect. Whether the stress induced, instrumentally and experimentally, was too intense for effective voice analysis cannot be determined from the results. There is some evidence, though insignificant, that accuracy increases slightly in non-polygraph subjects. It is mentioned only because a similar trend was observed for the PSE data.

CHAPTER 4. SUMMARY AND CONCLUSIONS

The major purpose of this research was to evaluate the voice-analysis technique, as represented by two existing types of instrument, for its suitability in lie detection applications. The basis for evaluation was a comparison of voice-analysis techniques against an established technique, the polygraph, in terms of the success of each in detecting lying responses. Additionally, the results obtained with the voice-analysis instruments were compared to those yielded by trained polygraph operators and auxiliary experimenters making their judgments on the basis of direct observation of the behavior (verbal and non-verbal) of subjects being interrogated. Essentially the findings indicated the clear inferiority of voice analysis, in its present state of development, not only to the polygraph, but also to judgments made on the basis of simply observing subjects' behavior.

The experimental procedure involved the execution of a simulated theft of money by a pair of subjects, one of whom served as a lookout for the other, the thief. For each "guilty" pair, there was also an "innocent" subject who knew only that a theft had been committed. Each such triad was interrogated immediately following the commission of the "crime," and the judges' task was to determine the roles played by each: who was the Thief, who the Lookout, and who the Innocent Suspect.

Tape recordings of all the interrogations were made for voice-analysis purposes. Additionally, polygraph records were made of the interrogations of approximately 80 percent of the triads. The remaining triads were questioned without the polygraph.

Interrogation proceeded in three stages. First, subjects responded to a questionnaire of the Relevant-Irrelevant type. Second, they took a modified Peak-of-Tension test involving the exact amount of money that was stolen. Third, subjects were given an Association test to two series of words, which included critical words relating to the crime. The interrogation was conducted by two persons, the Examiner who actually posed the questions, and a Tape Monitor whose function was to control the volume for the tape recording.

Following the interrogations, decisions as to the role played by each member of a triad of subjects were made in a variety of ways by a number of researchers associated with the experiment in different capacities. The Examiners and Tape Monitors made judgments immediately following the interrogation, using as the basis for their judgments their overall, global "impressions" of the subjects' behavior during interrogation. Additionally, during the polygraph examination the Examiners could see the chart print-out as questioning proceeded but had limited opportunity to note the details of the record at this time.

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Approximately two weeks after an interrogation, each of the Examiners made a careful, formal analysis of the polygraph records, using established criteria in which they had been trained. They analyzed the records in sets of three (triads) and indicated which record was that of the Thief, the Lookout, and the Innocent Suspect.

At a later time, two other experienced polygraph operators (not actual Examiners of the subjects) also analyzed the polygraph records. These raters evaluated each record on an individual basis, independently of any other records, and rendered a judgment as to the role that subject played in the experiment.

The third type of evaluation involved the analysis of the tape recordings by each of two current voice-analysis techniques: The Dektor Psychological Stress Evaluator (PSE) distributed by George F. Cake Co., and the Voice Stress Analyzer (VSA) manufactured by Decision Control, Inc. In point of time, the behavior of the subject was evaluated first; his polygraph chart, second; and his voice recording, last.

The results may be summarized as follows. On the basis of immediate global impression, both Examiners and Tape Monitors identified subjects' roles in the "theft" to a significantly high degree, with the Examiners who could see the polygraph charts, not surprisingly doing somewhat better than the Tape Monitors. The accuracy with which these immediate impressionistic judgments could be made provides evidence that the paradigm of the simulated theft is a valid experimental procedure for lie detection research in that it does in fact induce differentially detectable behavior in subjects.

Analysis of the polygraph records produced the following results. Evaluating the records they had obtained in triads, Examiners attained an overall accuracy of 76 percent. Each role (Thief, Lookout, Innocent Suspect) was identified with approximately equal success.

There was some indication of differential detectability of lying according to sex of the subject; the Examiners were notably more accurate in evaluating the records of male than of female subjects (83 percent versus 65 percent). The reason for this difference is not readily apparent.

The success of the Examiners leaves no doubt that the polygraph was an effective instrument of detection in their hands, of sufficient precision to discriminate degrees of guilt (Thief vs Lookout), as well as distinguishing guilt from innocence. Here, again, this success supports the validity of the simulated theft as an experimental paradigm in the study of differential emotional reactivity.

When the polygraph charts were analyzed on an individual basis (not in triads) by the two other experienced polygraph operators who had not participated in the actual interrogation, subjects' roles in the experiment were again identified with a significant degree of accuracy. On the other

hand, the constraints of individual analysis did produce accuracies somewhat lower than those obtained in triad analysis by the Examiners (50 - 60 percent versus 76 percent). Errors, when made, tended to be in the direction of an "innocent" verdict. Contrary to the results obtained in triad analysis, accuracy with female subjects was slightly, but not significantly, higher than with male subjects.

The results obtained with the voice recordings were generally insignificant. The operator of the Dektor Psychological Stress Evaluator analyzed the tapes on both an individual and a by-triads basis. Working with individual records, he obtained accuracies close to 33 percent, a value almost identical with chance expectation. In the triad analysis, the PSE analyst did worse with polygraph subjects (19 percent accuracy). However, he did significantly better with non-polygraph subjects, attaining an acceptably high accuracy of 53 percent. It is possible that the absence of stresses, attendant upon being fitted up with the polygraph attachments, produced clearer voice records for the non-polygraph subjects.

This cannot be the entire explanation, however, for the overall poorer showing of the PSE. For example, the nine polygraph triads evaluated by PSE analysis with an accuracy of 19 percent, were identified by the Examiners with an accuracy more than twice as great (44 percent). As for the non-polygraph subjects' records, the 53 percent accuracy of the PSE operator was surpassed by even the Tape Monitors, who obtained 83 percent accuracy in their immediate global judgments of these triads. In sum, the PSE analysis yielded either insignificant or non-competitive results.

The Voice Stress Analyzer generated a numerical value for each "Yes" or "No" response during the interrogation. These values were transformed into judgments comparable to those obtained from the PSE analyst. It was found that neither polygraph or non-polygraph subjects attained a significantly greater value than the chance expectation of 33 percent. However, the trend observed with the PSE, toward slightly greater accuracy with non-polygraph subjects, was also apparent with the VSA.

The conclusion of this research is that neither of the presently existing voice-analysis instruments may be accepted as valid "lie detectors" within the constraints of an experimental paradigm.

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APPENDIX

Supervisor Instructions

Examiner Instructions

INFORMATION FORM

Name _____ University _____
Last First Middle

Date of Birth _____ School _____
Month Day Year (Within university)

Place of Birth _____
City State Country

Name of High School _____

CIRCLE CORRECT ALTERNATIVES:

Sex . . . . . M F
Marital Status . . . . . Single Married Other
Year in College . . . . . Freshman Soph Junior Senior

No. of Brothers . . . . . 0 1 2 3 4 Other _____
No. of Sisters . . . . . 0 1 2 3 4 Other _____
Residence . . . . . One-family house Apartment Other
Do you live in . . . . . Brooklyn Staten Island Other

Are you a U.S. citizen? . . . . . Yes No
Do you own a car? . . . . . Yes No
Do you own a motorcycle? . . . . Yes No

Were you ever fingerprinted? . . Yes No
Were you ever arrested? . . . . Yes No
Do you live on campus? . . . . . Yes No

Do you have a driver's license? . . . . . Yes No
Do you own a pet? . . . . . Yes No
Were you ever a patient with appendicitis in a hospital? . . . . . Yes No
Have you ever had a course in psychology? . . . . . Yes No

Pledge: I, _____, solemnly promise not to
(print your name in full)
reveal any of the details of this experiment to anyone, nor to discuss it with any other participant for a period of one year from this date.

Signed: _____

_____
(Date)

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SUPERVISOR INSTRUCTIONS

To Innocent Suspect

Your task is to enter the examining room and answer truthfully any questions which will be asked.

There has been a theft of some money in one of the faculty offices. You will be questioned about possible participation in it. For example, if you were asked "Did you steal the money or serve as an accomplice in this robbery?" you would, naturally, answer (NO). Since you know nothing about it and are completely innocent, there is nothing to worry about.

It is imperative that you do not discuss the nature of the questions or the research itself with anyone -- not any of your friends nor your family.

Also, don't ask the examiner any questions because his time is limited. I'll answer your questions after the test.

How well you comply with these directions will determine whether you are eligible for cash prizes.

Are there any questions?

To Thief and Accomplice

(To Both) Please choose one of these lots. When you open it you will know your role in this research. Sign your name on the lot. (Supervisor notes name on lot.) Now put it in your pocket. (If no pocket, in shoe.)

There is a handbag belonging to a woman faculty member in room 450 in this building, Dealy Hall.

(To Thief) You (point to Thief) must enter this room, open the handbag and rob the purse of all its contents. Leave the handbag and the purse in the room.

You may approach the room in any manner you like, but do not get caught.

While you are robbing the handbag you will have the help of your accomplice (point to accomplice).

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(To Lookout) Your job is to act as his (her) lookout, to warn him (her) of approaching students or faculty. You will warn him (her) in a manner which you both agree on, if danger is imminent.

You, however, are not to take the money. Neither are you to be close enough to the Thief (point to Thief) to know what has been taken.

(To Thief) And neither should you tell him (her).

Now, when you complete the robbery, signal the lookout to leave.

(To Lookout) After the Thief signals, you are to come back alone, immediately. Return to Room _____.

(To Thief) When the lookout has gone and you are a safe distance from room 450, examine what you have taken. Count the money. Put everything you have taken from the purse into your pocket, or hide it somewhere on your person. Return to Room _____ as soon as possible, but don't run.

(To Both) When you return, you will be taken to the examining room where you will be asked questions about the robbery of the handbag.

The examiner knows that the handbag will have been robbed but he does not know who did it.

Neither of you are to admit any guilt or participation in this matter. For example, if either of you are asked "Did you steal the money or serve as an accomplice in this robbery?" you are to say (NO). Is that clear?

Remember, deny any participation in or knowledge of the robbery. Answer NO to all questions about the robbery.

If you comply with the directions that you have been given, you will be eligible for cash prizes.

Any questions?

Debriefing Subjects

As you realize, this experiment aims to evaluate several physiological indices as measures of emotional adaptation.

Your cooperation is appreciated.

Remember, you are eligible for a prize -- once the experiment is completed.

We will get in touch with you about this at that time.

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EXAMINER INSTRUCTIONS

Pre-Test Period

This is a lie detection machine similar to the ones used in police work. The innocent person has nothing to fear, since the procedure clearly proves his innocence. The matter is quite different for the guilty person. These machines have an excellent record in identifying the criminal. And the criminal has a difficult job concealing his guilt. (PAUSE)

I'd like you to sit in this chair so that I can attach you to the machine. Please remove any ring or watch you have on. (STRAP IN)

Routinely attach (1) Pneumograph bellows
(2) Lavalier microphone
(3) PGR electrodes
(4) BP cuff (Inflate momentarily.)
in order listed above. When putting on BP cuff tell S:

This cuff may cause your hand and arm to turn red and also get a bit uncomfortable. If it gets too uncomfortable, just let me know.

Are you in a comfortable position? Please don't make any movements; they only spoil the records. Your cooperation in avoiding movements is necessary so that we don't have to waste any time retesting.

Before Interrogation

First, I will ask a number of questions, some of which will be about the robbery. To all questions give only a YES or NO answer. Some questions will be repeated more than once.

There are no trick questions. All of them can be answered by a YES or NO.

READY? O.K. I'll inflate the cuff.

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Part 1. INTERROGATION FORM

1. Is your name _____?

2. Do you have any brothers? sisters? pets? NX
3. Were you an accomplice to the thief?
4. Are you a Law School student?

5. Are you married? single? NX
6. Did you plan this robbery with someone else?
7. Do you live in a one-family house? an apartment? NX

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8. Did you graduate from high school?
9. Have you served in the armed forces?
10. Do you know who stole the money from room 450?
11. Do you live (on off) campus? NX

12. Are you an American citizen?
13. Have you ever been arrested?
14. Were you an accomplice to the thief?
15. Do you live in Brooklyn? Staten Island? NX

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16. Are you a college student?
17. Do you have any brothers? sisters? pets? NX
18. Do you have the stolen money with you?
19. Do you own a motorcycle? car? NX

20. Have you served in the armed forces?
21. Did you plan this robbery with someone else?
22. Do you live (on off) campus? NX
23. Were you born in 19___? (Fill in date)

---

24. Are you married? single? NX
25. Do you know who stole the money from room 450?
26. Do you live in a one-family house? an apartment? NX
27. Were you born in the United States?

28. Have you ever been arrested?
29. Do you have the stolen money with you?
30. Do you live in Brooklyn? Staten Island? NX

Alternate NO Questions

31. Are you a School of Commerce student?
32. Were you born in Europe?

Alternate Pre-Critical Questions

33. Were you ever fingerprinted?
34. Were you operated on for appendicitis?

42

Part 2. NUMBERS TEST

This time I am going to say some numbers.

These refer to money, so that one means one dollar, and 15 means 15 dollars.

Now when I say a number, you are to say NO to each number I say.

Is that clear? Fine, here are the numbers I will say.

(Inflate BP cuff) 15 17 19 21 23 25

Part 3. ASSOCIATION TEST

Now I'm going to say a number of words. I want you to say the first word that comes into your mind when you hear each word that I say. READY?

(Inflate BP cuff)

APPLE EAGLE HANDBAG PENCIL TABLE LOOKOUT, ROADSIDE

(Stop, deflate cuff)

(Inflate BP cuff)

WINDOW WARLIKE RIBBON SPRINGTIME OCEAN

FINAL INSTRUCTIONS

Good. Thank you.

Now go back to the supervisor for the final instructions.

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13 ABSTRACT

Two voice-analysis techniques were evaluated as lie detection devices in a simulated theft experiment which utilized 174 subjects. One group of subjects (n = 137) was examined with the polygraph at the same time as voice recordings were taken. A smaller group (n = 37) was tested only with voice recordings. Both groups of subjects consisted of male and female university students.

The results failed to demonstrate that either of the voice-analysis techniques was effective in identifying the three basic roles (Thief, Lookout, Innocent Suspect) of the simulated theft. In contrast, the polygraph achieved an accuracy score of 76 per cent, a value comparable to that obtained in previous studies using the simulated theft paradigm. Independent raters, who knew nothing about the characteristics of the persons examined, also obtained significantly high accuracy scores in the examination of the polygraph charts (50 - 60 per cent).

Although the overall results obtained from voice recordings were not statistically significant, lower voice-accuracy was obtained with polygraph-tested subjects than with those who were examined without the polygraph.

A subsidiary result concerns the ratings of tape monitors who were present during all interrogation sessions. Basing their judgments only on their immediate global impressions, they were able to discriminate between the thief, lookout, and innocent suspect with a significant degree of accuracy. This capability, together with the highly significant accuracy scores of the polygraph examiners, demonstrate that the

DD FORM 1 NOV 1473 REPLACES DD FORM 1473, 1 JAN 68, WHICH IS OBSOLETE FOR ARMY USE.

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Security Classification

Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Voice Analysis						
Psychological Stress Analyser						
Voice Stress Analyser						
Polygraph						
Lie Detection						
Stress						
Physiological Responses						
Blood Pressure						
Respiration						
Galvanic Skin Response						

Security Classification

ABSTRACT (cont.)

simulated theft procedure is valid for lie detection research, in that it induces in subjects a sufficient degree of emotional responsiveness and involvement to enable the polygraph examiners and tape monitors to differentiate among the three basic roles of the simulated theft situation.

The failure of the voice-analysis techniques to detect these differences can not, then, be attributed to insufficient emotionality in the subjects. Rather it would seem to be a matter of insensitivity or other inadequacy in the devices themselves in their present state of development.

STATEMENT OF

MR. ROBERT A. BRISENTINE, JR.
SENIOR POLYGRAPH EXAMINER, U. S. ARMY
CRIMINAL INVESTIGATION COMMAND

TO THE

FOREIGN OPERATIONS AND GOVERNMENT
INFORMATION SUBCOMMITTEE

OF THE

HOUSE COMMITTEE ON GOVERNMENT OPERATIONS

U. S. HOUSE OF REPRESENTATIVES

ON

THE USE OF THE POLYGRAPH

JUNE 5, 1974

The US Army training facility for polygraph examiners is located at the US Army Military Police School, Fort Gordon, Georgia. This training program was established on 16 July 1951 and since that time the US Army has trained 1,251 polygraph examiners. This does not include nine students presently attending the training course. The original training period was eight weeks in duration; however, on 6 July 1965, the course was extended to 12 weeks and since 10 August 1970 the school has been 14 weeks in duration. In addition to the 14 week formal training phase, each examiner must serve an internship prior to certification as a polygraph examiner.

Training of polygraph examiners by the US Army is accomplished for the US Army, US Air Force, US Navy, US Marine Corps, US Treasury Department, and the US Postal Service. The Army has also trained polygraph examiners for the US Coast Guard; the National Security Agency; US civilian police agencies under the Law Enforcement Assistance Administration; Canadian Defense Forces; Philippine Army; the Republic of Korea Army; Pakistani Army; Republic of Nationalist China Army; and the Venezuelan Army.

In addition to the 1,251 graduates of the Basic Course; Advanced, Refresher, or Personnel Security Training has been afforded 270 students.

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Prior to 10 August 1970, the failure ratio was 10.9% (125 of 1,143); however, since that date a change in the selection for training criteria and an increase in the training period has resulted in only a 6.5% (7 of 108) failure ratio of the course.

The prerequisites for attendance by all DoD personnel include -- US citizen, at least 25 years of age, baccalaureate degree from an accredited college, plus 2 years experience as an investigator with a recognized government agency; or the equivalent of 2 years of college, plus 5 years of investigative experience. Personnel attending the course from other Department of Defense or other federal agencies must meet prerequisites as determined by their respective agencies.

There are 506 academic hours in the Polygraph Examiner Course, which includes 13 hours of Polygraph Theory and Administration, 19 hours of Polygraph Maintenance Management, 84 hours of Polygraph Examination Procedures, 34 hours of Training Regarding Evaluation of Mental and Physical Fitness of Examinee, 331 hours of Comprehensive Practical exercises, and 25 hours of examinations. There are also 54 hours of non-academic (administrative) time included in this course, with a total course time of 560 hours or fourteen weeks.

Each of the subjects regarding the preparation for and the conduct of polygraph examinations are taught by experienced polygraph examiners while training in Law, Psychology, Physiology, Pharmacology, and other technical non-polygraph subjects are taught by experts in these fields. These subjects prepare the students to better observe physical or mental abnormalities that may preclude conclusive results in a polygraph situation, or symptoms to recognize when a potential examinee should be referred for appropriate professional evaluation as to his suitability for polygraph testing. During this training each student conducts two to three polygraph examinations per day for a period of 47 days. These examinations are of hypothetical crimes or incidents. The students are monitored directly by an instructor on each of these examinations and are critiqued on their progress following each examination. Monitorship by instructors is accomplished on the basis of one instructor for each two students.

Polygraph maintenance instruction includes training the examiner to repair and calibrate each type of polygraph instrument within the DoD according to the manufacturer's specifications.

A copy of the Program of Instruction for the Polygraph Examiner Course is attached as an inclosure.

Based on current FY 1974 funding, the cost per student for the Basic Course amounts to $6,283.11, which includes equipment, upkeep of buildings, support personnel, and the payment of instructors' salaries. These instructors, in addition to teaching polygraph subjects, also conduct polygraph examinations in support of US Army criminal investigations, monitor intern examiners, and teach other investigative related subjects.

The National Security Agency presently receives their polygraph training at the Keeler Polygraph Institute in Chicago, Illinois. Following this training of a duration of six weeks, National Security Agency examiners serve an internship of six months or the conduct of 250 polygraph examinations under the direct supervision of a certified National Security Agency examiner. The NSA utilizes only one type of polygraph procedure (screening), while the DoD school teaches a broad spectrum of procedures.

The Polygraph Examiner Refresher Course, a three week or 120 hour course, affords advanced or refresher training for the practicing polygraph examiner and the requalification and certification of previously trained personnel who have not been active as polygraph examiners. This course provides refresher training in all facets of polygraph examination procedures and polygraph instrumentation, as well as subjects related to the conduct of polygraph examinations.

It is encouraged within the DoD that polygraph examiners receive advanced or refresher training each two years at either the US Army Training Facility, or at Civilian Advanced training seminars or work shops. A copy of the Polygraph Examiner Refresher Course Program of Instruction is attached hereto as an inclosure.

The internship prior to certification within the military departments of DoD is six months to one year in length following the formal phase of polygraph training. During this period, each examiner will conduct polygraph examinations in support of criminal or security investigations wherein polygraph charts are generated. Prior to certification, each intern examiner will conduct examinations of individuals who are truthful, who are practicing deception, and from examinees whose charts cannot be interpreted. All examinations conducted by intern examiners are directly supervised by a certified examiner.

In addition to the formal training and the internship served by each examiner, all polygraph examination charts and documents are reviewed for quality by Supervisor Polygraph Examiners at a central location within the components. This includes a review to determine if the findings by the examiner were verified by the collected polygraph charts; a review to determine if appropriate test and question construction were utilized; quality of instrumentation

patterns, and calibration of the polygraph instrument, and a review to determine if the examinee has been properly advised of his constitutional rights. Following the review, a critique letter is returned to the examiner. This type of quality control has existed since 1967.

Thank you for this opportunity to present the DoD Polygraph Training Program.

United States Army
Military Police School

FORT GORDON, GEORGIA 30905

DECEMBER 1973

Program of Instruction for

7H-F11

POLYGRAPH EXAMINER TRAINING COURSE

MOS: SUFFIX K ADDED

LENGTH: PEACETIME - 14 WEEKS
MOBILIZATION - 11 WEEKS, 4 DAYS

APPROVED BY: CDR, TRADOC
30 NOVEMBER 1973

THIS POI SUPERSEDES POI FOR THE POLYGRAPH EXAMINER TRAINING COURSE, JUNE 1972.

THIS COURSE HAS BEEN SYSTEMS ENGINEERED.

Section I - Preface

A. Course: 7H-F11, Polygraph Examiner Training.

B. Purpose: To qualify military and federal civilian investigative/intelligence personnel as polygraph examiners. MOS for which trained: None. Suffix K (Certified Polygraph Examiner) added to current MOS.

C. Prerequisites: Warrant officer and civilian personnel: US citizen. At least 25 years of age. Graduate (baccalaureate degree) of an accredited college, plus 2 years as an investigator with a recognized government agency; or the equivalent of 2 years of college as prescribed by AR 621-5, plus 5 years of investigative experience. No security clearance required. Obligated service for active Army warrant officers: 1 year.

Special information: Personnel selected by chiefs of all Department of Defense and other federal agencies must meet prerequisites as determined by their respective agencies.

	Peacetime	Mobilization
D. Length:	14 weeks	11 weeks, 4 days
E. Training location:	U. S. Army Military Police School	U. S. Army Military Police School

F. MOS feeder pattern:

Prerequisite MOS	MOS Trained in This Course	Feeds Following MOS
WO 951A	Suffix K added	None

G. Ammunition requirements: No ammunition required.

H. Selected training recapitulation: Not applicable.

I. Standardization of prefix digit 5 training: Not applicable.

Section II - Summary

Course - Polygraph Examiner Training, 7H-F11

Hours - 560 hours

Subject	Hours	Annex	Page
A. Academic Subjects			
Polygraph Theory and Administration	13	A	6
Polygraph Maintenance Management	19	B	8
Polygraph Examination Procedures	84	C	10
Evaluation of Mental and Physical Fitness of Examinee	34	D	14
Comprehensive Practical Exercises	331	E	17
Examinations	25	F	20
Subtotal	506		
B. Nonacademic Subjects			
Inprocessing	5		
Outprocessing	2		
Physical Conditioning	24		
Commandant's Time	12		
Open Time	11		
Subtotal	54		
Total	560		
C. Recapitulation			
1. Security Classification			
Unclassified (U)	560		
2. Type of Instruction			
Conference (C)	137.5		
Hardware Practical Exercise (PE1)	12		
Nonhardware Practical Exercise (PE2)	281		
Classroom Practical Exercise (PE3)	7.5		
Demonstration (D)	3.5		
Film (F)	3.5		
Case Study (CS)	23		

Summary (cont)

Subject	Hours	Annex	Page
Television (TV)	13		
Examination (E)	25		
Nonacademic	54		
Total	560		

Section III - Body

Course - Polygraph Examiner Training, 7H-F11

Academic Subjects - Peacetime: 506 hours; Mobilization: 506 hours

Annex Title and Subjects	Hours	Annex	Page
Polygraph Theory and Administration		A	6
Theory of Detection of Deception	3		6
Polygraph Regulations, References, Records, and Reports	2		6
Legal Considerations	5		6
Semantics	3		7
Annex Total	13		
Polygraph Maintenance Management		B	8
Polygraph Nomenclature, Function, and Maintenance	11		8
Proper Functioning of all Components of the Stoelting . (Model AN/USS-2D) Polygraph Instrument	6		8
Proper Functioning of Other Polygraph Instruments	2		8
Annex Total	19		
Polygraph Examination Procedures		C	10
Pretest Procedures and Interviews	9		10
Zone Comparison Test Construction (ZCT)	10		10
Peak of Tension (POT) Test Construction	4		10
Test Graph Markings	2		11
Polygraph Operation	8		11
Chart Interpretation	21		11
Post-Test Procedures	9		11
Presentation of Briefings/Court Testimony	4		12
Modified General Question Technique (MGQT)	2		12
General Question Test (GQT) Construction	2		12
Personnel Screening Techniques	13		12
Annex Total	84		
Evaluation of Mental and Physical Fitness of Examinee		D	14
Dynamics of Normal Behavior	8		14
Introduction to Abnormal Psychology	2		14
Neurotic and Psychotic Reactions	8		14
The Sociopathic Personality	2		14

Body (cont)

Annex Title and Subjects	Hours	Annex	Page
The Human Body	2		15
The Nervous System	5		15
The Cardiovascular System	3		15
The Respiratory System	2		16
Pharmacology	2		16
Annex Total	34		
Comprehensive Practical Exercises		E	17
Phase I, Conduct of Zone Comparison Technique Polygraph Examinations	16		17
Phase II, Conduct of Zone Comparison Technique Polygraph Examinations	45.5		17
Phase III, Conduct of Peak of Tension Polygraph Examinations	24		17
Phase IV, Conduct of Peak of Tension Polygraph Examinations	32		18
Phase V, Conduct of Zone Comparison Technique Polygraph Examinations	48		18
Phase VI, Conduct of Zone Comparison Technique Polygraph Examinations	42.5		18
Phase VII, Conduct of Modified General Question Technique Polygraph Examinations	16		18
Phase VIII, Conduct of Modified General Question Technique Polygraph Examinations	31		19
Phase IX, Conduct of Personnel Screening Polygraph Examinations	24		19
Phase X, Conduct of Personnel Screening Polygraph Examinations	52		19
Annex Total	331		
Examinations		F	20
Performance Test Number 1	.5		20
Performance Test Number 2	1		20
Performance Test Number 3	1.4		20
Performance Test Number 4	1.6		21
Performance Test Number 5	2.5		21
Performance Test Number 6	3		21
Performance Test Number 7	3		22
Performance Test Number 8	4		22
Performance Test Number 9	2		23
Performance Test Number 10	6		23
Annex Total	25		

Section IV - Annexes

Annex A - Polygraph Theory and Administration

Purpose - The student will become familiar with the limitations of the polygraph and with the theories of detection of deception. The student will become familiar with polygraph regulations, directives, references, records, and reports; he will be prepared to observe legal considerations in polygraphy; he will apply the principles of semantics to the conduct of pretest interviews and test question formulation.

File No		Clas	Type of Instruction

IN100 - Theory of Detection of Deception

Hours: 3 U 2C, 1D

Objective: Under pertinent supervision and guidance of a qualified instructor, the student will become familiar with the principles underlying the theory of detection of deception; physiological changes recorded by the pneumograph, cardiosphygmograph, and galvanograph components; principles of test construction; and limitations of the polygraph. A complete polygraph examination will be demonstrated.

Ref: AR 195-6; TM PMG 22; Truth and Deception, Inbau and Reid; Annual Report on Polygraph Trends, Academy of Scientific Interrogation, Backster; Lie Detection and Criminal Interrogation, Inbau and Reid; Anticlimax Dampening Concept, Backster; Outside Superdampening Factor, Backster; Lying and Its Detection, Trovillo.

IN102 - Polygraph Regulations, References, Records, and Reports

Hours: 2 U 1C, 1PE2

Objectives: Given applicable references and forms, the student will formulate polygraph reports in accordance with current regulations and directives under simulated polygraph examination room conditions and will determine the proper method of preparation and distribution of the reports.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); School material.

LN104 - Legal Considerations

Hours: 5 U 4C, 1PE2

Annex A (cont)

File No | Clas | Type of Instruction

Objective: Given pertinent references and materials and under classroom conditions simulating a polygraph examination room, the student will become able to determine the various types of evidence; he will become capable of advising a prospective examinee of his legal rights and will become familiar with the rules of admissibility pertaining to the results of a polygraph examination.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); CM Reports.

IN106 - Semantics

Hours: 3 U 2C, 1PE2

Objective: Under classroom conditions simulating a field polygraph examination environment, the student will apply the principles of semantics to the conduct of pretest interviews and test question formulation.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); Semantics and Common Sense, Solomon; Language in Thought and Action, Hayakawa.

Annex Total 13

Annex B - Polygraph Maintenance Management

Purpose - The student will be able to differentiate between the various components and accessories of polygraph instruments currently in use by all of the armed services and other federal agencies; he will further be capable of maintaining such instruments at minimum standards applicable to the service or agency concerned, to include familiarity with and implementation of current maintenance directives and electronic maintenance forms.

File No		Clas	Type of Instruction

IN200 - Polygraph Nomenclature, Function, and Maintenance

Hours: 11 U 2C, 1D, 7PE1, 1TV

Objective: Given proper references and tools or equipment, and under polygraph maintenance room environment conditions, the student will understand the functions of all components of the model AN/USS-2D polygraph and will become familiar with the nomenclature of each component; he will disassemble and assemble the instrument; he will perform organizational maintenance; he will isolate and identify malfunctions which require higher echelon maintenance; he will maintain records concerning equipment maintenance.

Ref: TM 11-5538A; TM 11-6695-200-20P; TM 11-6695-200-35P; TM 11-6695-203-15; TM 11-6695-203-25P; TVR 1-33; TVR 1-34; TVR 1-35.

IN202 - Proper Functioning of All Components of the Stoelting (Model AN/USS-2D) Polygraph Instrument

Hours: 6 U .5C, .5D, 5PE1

Objective: Given proper references, tools, and materials including a Stoelting Model AN/USS-2D polygraph instrument, and under polygraph maintenance room conditions, the student will methodically inspect all components for sensitivity and/or leakage, identify and isolate malfunctions peculiar to this instrument, and maintain maintenance documents for this instrument.

Ref: TM 11-5538A; TM 11-6695-200-20P; TM 11-6695-200-35P; TM 11-6695-203-15; TM 11-6695-203-25P.

IN204 - Proper Functioning of Other Polygraph Instruments

Hours: 2 U 1C, 1D

Objective: Given other Stoelting polygraph instruments, Keeler polygraph instruments, and LaFayette polygraph instruments, the

Annex B (cont)

	Clas	Type of Instruction
		student will identify variations in the functioning and maintenance procedures of these instruments from those of the AN/USS-2D instrument.
Ref:		TM 11-6695-210-12; TM 11-6695-203-15; Polygraph Lie Detectors, C. H. Stoelting Co.; Keeler Polygraphs, T. P. Manual 70-1, Associated Research, Inc.; LaFayette Manual, LaFayette Instrument Co.
Annex Total	19	

Annex C - Polygraph Examination Procedures

Purpose - The student will formulate test questions according to current and accepted techniques; he will conduct pretest and post-test interviews; he will properly prepare polygraph charts; and will deliver briefings/court testimony regarding polygraph operation.

File No		Clas	Type of Instruction

IN300 - Pretest Procedures and Interviews

Hours: 9 U 2C, 5PE2, 2TV

Objective: Under conditions simulating a polygraph examination environment and using pertinent reference materials, the student will practice the procedures and techniques involved in administering pretest interviews to prospective polygraph examinees.

Ref: AR 195-6; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; TVR 8-70; TVR 440.

IN302 - Zone Comparison Test Construction (ZCT)

Hours: 10 U 4C, 1TV, 5PE2

Objective: Under classroom conditions simulating a polygraph examination room and given pertinent reference materials, the student will formulate valid polygraph test questions utilizing the Zone Comparison Technique.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); Zone Comparison Technique, Backster; School material; TVR 8-3.

IN304 - Peak of Tension (POT) Test Construction

Hours: 4 U 2C, 2PE2

Objective: Under classroom conditions simulating a polygraph examination room and given pertinent references, the student will formulate valid polygraph questions utilizing the Peak of Tension question technique.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); Truth and Deception Inbau and Reid; The Keeler Technique, Harrelson; Lie Detection and Criminal Interrogation, Inbau and Reid.

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Annex C (cont)

File No | Clas | Type of Instruction

IN306 - Test Graph Markings

Hours: 2 U 1.5C, .5PE3

Objective: Under instructor supervision, using pertinent references in a classroom, the student will use the signs and symbols peculiar to the marking of charts or polygrams prior to, during, and after the conduct of polygraph examinations.

Ref: AR 195-6; TB PMG 22; Uniform Chart Markings, Backster; The Keeler Technique, Harrelson; Operator's Manual, C. H. Stoelting Co.

IN308 - Polygraph Operation

Hours: 8 U .5C, 6.5PE2, 1TV

Objective: With instructor supervision and under conditions simulating a polygraph examination room, the student, using previously distributed materials and an AN/USS-2D polygraph instrument, will attach/activate and detach/deactivate the instrument on a prospective examinee.

Ref: TM 11-5538A; School material; TVR 8-3; TVR 8-71.

IN310 - Chart Interpretation

Hours: 21 U 8C, 7PE3, 6CS

Objective: Under instructor supervision and given reference material and complete properly marked polygraph charts, the student will interpret polygrams and charts depicting responses on the three basic components of a polygraph instrument.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; Lie Detection and Criminal Interrogation, Inbau and Reid; The Keeler Technique, Harrelson; Backster Zone Comparison Technique, Backster; School material.

IN312 - Post-Test Procedures

Hours: 9 U 2.5C, 5PE2, .5TV, 1F

Objective: Under conditions simulating a polygraph examination room environment and given a polygraph instrument, the student

Annex C (cont)

File No | Clas | Type of Instruction

will prepare to execute the terminal phase of all types of polygraph examinations in accordance with the outcome of the examination.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); Criminal Interrogations and Confessions, Inbau and Reid; School material; TVR 8-72 (part III); FBI film, "Interviews."

IN314 - Presentation of Briefings/Court Testimony

Hours: 4 U 2C, 2PE2

Objective: Under classroom conditions simulating briefing/court conditions and given appropriate notes and displays, the student will deliver briefings/court testimony.

Ref: School material.

IN316 - Modified General Question Technique (MGQT)

Hours: 2 U 1C, 1PE2

Objective: Under classroom conditions simulating a polygraph examination room, and with pertinent references, the student will formulate valid polygraph questions using the Modified General Question Technique.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); Lie Detection and Criminal Interrogation, Inbau and Reid; Truth and Deception, Inbau and Reid.

IN318 - General Question Test (GQT) Construction

Hours: 2 U 1C, 1PE2

Objective: Under classroom conditions simulating a polygraph examination room, the student will formulate General Question polygraph tests.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); The Keeler Technique, Harrelson.

IN320 - Personnel Screening Techniques

Hours: 13 U 7.5C, 4PE2, 1.5TV

Annex C (cont)

File No Clas Type of Instruction

Objective: Under classroom conditions simulating a polygraph examination room, and with pertinent references, the student will formulate and apply test questions peculiar to the conduct of personnel screenings.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; Annual Report on Polygraph Trends, Academy for Scientific Interrogation, 1961, Backster; The Keeler Technique, Harrelson; TVR MP5-73.

Annex Total 84

Annex D - Evaluation of Mental and Physical Fitness of Examinee

Purpose - The student will prepare to make determinations concerning the mental and physical suitability of prospective polygraph examinees.

File No | Clas | Type of Instruction

IN400 - Dynamics of Normal Behavior

Hours: 8 U 6C, 1.5TV, .5F

Objective: Under pertinent supervision and guidance of a qualified instructor in a classroom setting, the student will gain a basic understanding of the normal behavior of the human organism.

Ref: Abnormal Psychology and Modern Life, Coleman; Educational Psychology, Cronbach; An Introduction to Psychology, Murphy; CF, "Not All Cops, Not All Kids"; TVR 2-71; TVR 20-70; TVR 5142.

IN402 - Introduction to Abnormal Psychology

Hours: 2 U 1C, 1TV

Objective: Under supervision and guidance of a qualified instructor in a classroom setting, the student will summarize abnormal behavior, both descriptively and interpretatively. He will discuss differences between normal and abnormal behavior, with emphasis on the deviations or aberrations normally associated with the human organism.

Ref: Abnormal Psychology and Modern Life, Coleman; TVR 19-312.

IN404 - Neurotic and Psychotic Reactions

Hours: 8 U 7C, 1TV

Objective: Under the guidance of a qualified instructor in a classroom setting, the student will relate and apply the implications of neurotic and psychotic disorders to use of the polygraph.

Ref: Abnormal Psychology and Modern Life, Coleman; TVR 8-73; TVR 8-3968.

IN406 - The Sociopathic Personality

Hours: 2 U 1C, 1TV

Objective: Under instructor supervision in a classroom setting, the student will relate the symptoms of sociopathic personality

Annex D (cont)

File No | Clas | Type of Instruction

disorders to the use of the polygraph as an investigative aid.

Ref: Abnormal Psychology and Modern Life, Coleman; The Adolescent, Seidman; Society and the Criminal, East; Delinquency, Block and Flynn; TVR 8-3835.

IN408 - The Human Body

Hours: 2 U 2C

Objective: Under instructor supervision in a classroom setting, the student will gain an understanding of the functions of cells, tissues, and major organs and systems of the human body.

Ref: Basic Physiology and Anatomy, Chaffee and Greisheimer; The Physiology of Man, Langley and Cheraskin; Physiology, Tuttle and Schottelius.

IN410 - The Nervous System

Hours: 5 U 4C, 1F

Objective: Under instructor supervision in a classroom setting, the student will learn how the nervous system is related to polygraph examinations as applied stimuli are converted to nervous impulses, perception, and memory.

Ref: Textbook of Physiology, Tuttle and Schottelius; Basic Physiology and Anatomy, Chaffee and Greisheimer; CF, "Gateways to the Mind."

IN412 - The Cardiovascular System

Hours: 3 U 2C, 1F

Objective: Under instructor supervision in a classroom setting, the student will learn the basic functions of the cardiovascular system with emphasis on the role and implications of physiological changes occurring during the conduct of polygraph examinations.

Ref: Basic Physiology and Anatony, Chaffee and Greisheimer; The Physiology of Man, Langley and Cheraskin; Textbook of Physiology, Tuttle and Schottelius; CF, "Hemo the Magnificent."

Annex D (cont)

File No | Clas | Type of Instruction

IN414 - The Respiratory System

Hours: 2 U 1.5C, .5TV

Objective: Under instructor supervision in a classroom setting, the student will learn the basic functions of the respiratory system with emphasis on the role and implications of the system in polygraphy.

Ref: Basic Physiology and Anatomy, Chaffee and Greisheimer; The Physiology of Man, Langley and Cheraskin; Textbook of Physiology, Tuttle and Schottelius; TVR 8-98631.

IN416 - Pharmacology

Hours: 2 U 1C, 1TV

Objective: Under instructor supervision, the student will gain a basic understanding and appreciation of the effects of designated drugs on respiration, blood pressure, and psychogalvanic skin reactions in polygraphy.

Ref: AR 195-6; TB PMG 22; Textbook of Physiology, Tuttle and Schottelius; The Pharmacological Basis of Therapeutics, Goodman and Gilman; United States Pharmacopia, Journal of the American Medical Association; TVR 19-299.

Annex Total 34

Annex E - Comprehensive Practical Exercises

Purpose - The student will demonstrate the knowledge and skill gained from previous instruction by conducting polygraph examinations in varied situations which require the application of recommended principles, techniques, and procedures common to the field of polygraphy.

File No		Clas	Type of Instruction

IN500 - Phase I, Conduct of Zone Comparison Technique Polygraph Examinations

Hours: 16 U 4C, 11PE2, 1CS

Objective: Under operational conditions and given an AN/USS-2D polygraph instrument and an examinee, the student will conduct elementary practical exercises using the Zone Comparison Technique and will be individually critiqued.

Ref: TM 11-5538A; TM 11-6695-203-15; MCM, 1969 (Rev); Truth and Deception, Inbau and Reid; Criminal Interrogations and Confessions, Inbau and Reid; Uniform Chart Markings, Backster; School material.

IN502 - Phase II, Conduct of Zone Comparison Technique Polygraph Examinations

Hours: 45.5 U 9.5C, 34PE2, 2CS

Objective: Under operational conditions and given an AN/USS-2D polygraph instrument and an examinee, the student will conduct intermediate level practical exercises in the conduct of Zone Comparison Technique polygraph examinations and will be individually critiqued.

Ref: TM 11-5538A; TM 11-6695-203-15; MCM, 1969 (Rev); Truth and Deception, Inbau and Reid; Criminal Interrogations and Confessions, Inbau and Reid; Uniform Chart Markings, Backster; School material.

IN504 - Phase III, Conduct of Peak of Tension Polygraph Examinations

Hours: 24 U 6C, 16PE2, 2CS

Objective: Under operational conditions and given an AN/USS-2D polygraph instrument and an examinee, the student will conduct elementary practical exercises in the conduct of Peak of Tension polygraph examinations and will be individually critiqued.

Ref: Truth and Deception, Inbau and Reid; Criminal Interrogations and Confessions, Inbau and Reid; Uniform Chart Markings, Backster; School material.

Annex E (Cont)

File No | Clas | Type of Instruction

IN506 - Phase IV, Conduct of Peak of Tension Polygraph Examinations

Hours: 32 U 6C, 24PE2, 2CS

Objective: Under operational conditions and given an AN/USS-2D polygraph instrument and an examinee, the student will conduct intermediate level practical exercises in the conduct of Peak of Tension polygraph examinations and will be individually critiqued.

Ref: Truth and Deception, Inbau and Reid; Criminal Interrogations and Confessions, Inbau and Reid; The Keeler Technique, Harrelson; School material.

IN508 - Phase V, Conduct of Zone Comparison Technique Polygraph Examinations

Hours: 48 U 11C, 35PE2, 2CS

Objective: Under operational conditions and given a polygraph instrument and examinee, the student will conduct advanced examinations using the Zone Comparison Technique and will be individually critiqued.

Ref: Truth and Deception, Inbau and Reid; Criminal Interrogations and Confessions, Inbau and Reid; The Keeler Technique, Harrelson; School material.

IN510 - Phase VI, Conduct of Zone Comparison Technique Polygraph Examinations

Hours: 42.5 U 4C, 36.5PE2, 2CS

Objective: Under operational conditions and given a polygraph instrument and an examinee, the student will conduct advanced examinations using the Zone Comparison Technique and the Peak of Tension Technique, and will be individually critiqued.

Ref: Truth and Deception, Inbau and Reid; Criminal Interrogations and Confessions, Inbau and Reid; The Keeler Technique, Harrelson; School material.

IN512 - Phase VII, Conduct of Modified General Question Technique Polygraph Examinations

Hours: 16 U 4C, 11PE2, 1CS

Annex E (Cont)

File No Clas Type of Instruction

Objective: Under operational conditions and given a polygraph instrument and an examinee, the student will conduct elementary examinations using the Modified General Question Technique and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Lie Detection and Criminal Interrogation, Inbau and Reid; Truth and Deception, Inbau and Reid.

IN514 - Phase VIII, Conduct of Modified General Question Technique Polygraph Examinations

Hours: 31 U 7C, 22PE2, 2CS

Objective: Under operational conditions and given a polygraph instrument and an examinee, the student will conduct advanced examinations using the Modified General Question Technique and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Lie Detection and Criminal Interrogation, Inbau and Reid; Truth and Deception, Inbau and Reid.

IN516 - Phase IX, Conduct of Personnel Screening Polygraph Examinations

Hours: 24 U 6C, 17PE2, 1CS

Objective: Under operational conditions and given a polygraph instrument and an examinee, the student will conduct elementary practical exercises using polygraph personnel screening techniques and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; Annual Report on Polygraph Technique Trends - ASI, Backster; School material.

IN518 - Phase X, Conduct of Personnel Screening Polygraph Examinations

Hours: 52 U 10C, 40PE2, 2CS

Objective: Under operational conditions and given a polygraph instrument and an examinee, the student will conduct advanced practical exercises in the conduct of personnel screening polygraph examinations and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; Annual Report on Polygraph Technique Trends - ASI, Backster; School material.

Annex Total 331

Annex F - Examinations

Purpose - To provide a meaningful evaluation of each student, to measure student progress and the efficiency of instruction, and to further student learning and assist in providing student motivation.

File No | Clas | Type of Instruction

IN002 - Performance Test Number 1

Hours: .5 U .5E

Objective: Under operational conditions and given a polygraph instrument, the student will prepare to conduct a polygraph examination, to include troubleshooting and calibrating the instrument, and preparing the physical facilities. This test encompasses material presented in IN100, IN200, IN202, IN204, and IN300.

Ref: School material.

IN004 - Performance Test Number 2

Hours: 1 U 1E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee, and appropriate blank forms, the student will prepare to conduct a polygraph examination, and will conduct pretest operations, to include advising the examinee of his rights and obtaining his written consent, completing the appropriate blank forms, and preparing the examinee for examination. This test encompasses material presented in IN100, IN102, IN104, IN106, IN200, IN202, IN204, IN300, IN400, IN402, IN404, IN406, and IN500.

Ref: School material.

IN006 - Performance Test Number 3

Hours: 1.4 U 1.4E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee and appropriate blank forms, the student will prepare to conduct a polygraph examination, will conduct pretest operations, and will formulate appropriate test questions, using the Zone Comparison and Peak of Tension question formats. This test encompasses material presented in IN100, IN102, IN104, IN106, IN200, IN202, IN204, IN300, IN302, IN304, IN400, IN402, IN404, IN406, IN500, IN502, and IN504.

Ref: School material.

Annex F (Cont)

File No | Clas | Type of Instruction

IN008 - Performance Test Number 4

Hours: 2.1 U 2.1E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee and appropriate blank forms, the student will prepare to conduct a polygraph examination, will conduct pretest operations, will formulate appropriate test questions, and will conduct a polygraph examination, recording examinee responses to spoken stimuli on polygraph charts. This test encompasses material presented in IN100, IN102, IN104, IN106, IN200, IN202, IN204, IN300, IN302, IN304, IN306, IN308, IN400, IN402, IN404, IN406, IN500, IN502, IN504, and IN506.

Ref: School material.

IN010 - Performance Test Number 5

Hours: 2.5 U 2.5E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee and appropriate blank forms, the student will prepare to conduct a polygraph examination, will conduct pretest operations, will formulate appropriate test questions using the Zone Comparison and Peak of Tension question formats, will conduct a polygraph examination, and will interpret the Zone Comparison and Peak of Tension polygraph charts to form a conclusion on the examinee's truthfulness. This test encompasses material presented in IN100, IN102, IN104, IN106, IN200, IN202, IN204, IN300, IN302, IN304, IN306, IN308, IN310, IN400, IN402, IN404, IN406, IN408, IN410, IN412, IN414, IN416, IN500, IN502, IN504, IN506, IN508, and IN510.

Ref: School material.

IN012 - Performance Test Number 6

Hours: 4 U 4E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee and appropriate blank forms, the student will prepare to conduct a polygraph examination, will conduct pretest operations, will formulate appropriate Zone Comparison test questions, will conduct a polygraph examination, will interpret the Zone Comparison polygraph

Annex F (Cont)

File No | Clas | Type of Instruction

charts, and will take appropriate post-test action, including application of appropriate interrogational techniques, cleaning the instrument, preparing appropriate maintenance records, and preparing the written examination report. This test encompasses material presented in IN100, IN102, IN104, IN106, IN200, IN202, IN204, IN300, IN302, IN304, IN306, IN308, IN310, IN312, IN400, IN402, IN404, IN406, IN408, IN410, IN412, IN414, IN416, IN500, IN502, IN508, and IN510.

Ref: School material.

IN014 - Performance Test Number 7

Hours: 4 U 4E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee and appropriate forms, the student will prepare to conduct a polygraph examination, will conduct pretest operations, will formulate appropriate test questions using the Modified General Questions test format, will conduct the polygraph examination, will interpret the Modified General Questions polygraph charts to form a conclusion about the examinee's truthfulness, and will take appropriate post-test action. This test encompasses material presented in IN100, IN102, IN104, IN106, IN200, IN202, IN204, IN300, IN306, IN308, IN310, IN312, IN316, IN400, IN402, IN404, IN406, IN408, IN410, IN412, IN414, IN416, IN512, and IN514.

Ref: School material.

IN016 - Performance Test Number 8

Hours: 4 U 4E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee and appropriate blank forms, the student will prepare to conduct a polygraph examination, will conduct pretest operations, will formulate appropriate test questions using the General Questions/Personnel Screening test format, will conduct the polygraph examination, will interpret the General Questions/Personnel Screening polygraph charts, and will take appropriate post-test action. This test encompasses material presented in IN100, IN102, IN104, IN106, IN200, IN202, IN204, IN300, IN306, IN308, IN310, IN312, IN318, IN320, IN400, IN404, IN406, IN408, IN410, IN412, IN414, IN416, IN516, and IN518.

Ref: School material.

Annex F (cont)

File No | Clas | Type of Instruction

IN018 - Performance Test Number 9

Hours: 2 U 2E

Objective: Under conditions simulating a courtroom and given the assignment to present court testimony, the student will orally present appropriate testimony concerning the polygraph instrument, its uses, technical matters, and findings in specific examinations. This test encompasses generally all materials presented in the course and specifically material presented in IN314.

Ref: School material.

IN020 - Performance Test Number 10

Hours: 3.5 U 3.5E

Objective: Under operational conditions and given a polygraph instrument, a case file, an examinee and appropriate blank forms, the student will conduct a complete polygraph examination including preparation for the examination, pretest operations, formulation of test questions, conduct of the examination, chart interpretation, and appropriate post-test actions. This test encompasses all material presented in the course.

Ref: School material.

Annex Total 25

ARMY FT GORDON GA

United States Army
Military Police School

FORT GORDON, GEORGIA 30905

OCTOBER 1973

Program of Instruction for

7H-F10

POLYGRAPH EXAMINER REFRESHER COURSE

MOS: NONE

LENGTH: PEACETIME -- 3 WEEKS
MOBILIZATION -- NONE

APPROVED BY CDR, TRADOC
4 OCTOBER 1973

THIS POI SUPERSEDES POI FOR THE POLYGRAPH EXAMINER REFRESHER COURSE, NOVEMBER 1971.

THIS COURSE IS SYSTEMS ENGINEERED.

Section I - Preface

A. Course: 7H-F10, Polygraph Examiner Refresher.

B. Purpose: To provide warrant officer polygraph examiners with refresher training for requalification and certification. MOS for which trained: None.

C. Prerequisites: Warrant officers must meet the requirements outlined in AR 195-6. Must be qualified as Criminal Investigator (MOS 951AK). Must be assigned or under orders for assignment to a position as a polygraph examiner and require refresher training. No security clearance required. Obligated service for Active Army warrant officers: None.

Special information: Personnel selected by chiefs of all Department of Defense and other federal agencies must meet additional prerequisites as determined by that agency.

	Peacetime	Mobilization
D. Length:	3 weeks	None
E. Training location:	U. S. Army Military Police School	None

F. MOS feeder pattern:

Prerequisite MOS	MOS Trained in This Course	Feeds Following MOS
WO 951AK	None	None

G. Ammunition requirement: No ammunition required.

H. Selected training recapitulation: Not applicable.

I. Standardization of prefix digit 5 training: Not applicable.

Section II - Summary

Course - Polygraph Examiner Refresher, 7H-F10

Hours - 120

Subject	Hours	Annex	Pag
A. Academic Subjects			
Polygraph Examination Procedures	28	A	5
Polygraph Instrumentation	8	B	10
Polygraph Related Subjects	14	C	12
Polygraph Comprehensive Practical Exercises	38	D	14
Examinations	20	E	16
Subtotal	108		
B. Nonacademic Subjects			
Inprocessing	2		
Outprocessing	2		
Commandant's Time	4		
Open Time	4		
Subtotal	12		
Total	120		
C. Recapitulation			
1. Security Classification			
Unclassified (U)	120		
2. Type of Instruction			
Conference (C)	29.5		
Practical Exercise (PE)	48		
Demonstration (D)	1		
Case Study (CS)	4.5		
Film (F)	1		
Television (TV)	4		
Examination (E)	20		
Nonacademic	12		
Total	120		

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Section III - Body

Course - Polygraph Examiner Refresher, 7H-F10

Academic Subjects - Peacetime: 108 hours; Mobilization: None

Annex Title and Subjects	Hours	Annex	Page
Polygraph Examination Procedures		A	5
Use of the Polygraph in Investigations	1		5
Polygraph Regulations and References	1		5
Polygraph Question and Test Structure Principles	1		5
Semantics	1		5
Polygraph Question Formulation	2		6
Chart Interpretation Fundamentals	1		6
General Question Test Construction	4		6
General Question Test Interpretation	2		6
Zone Comparison Test Construction	2		7
Zone Comparison Test Evaluation	2		7
Peak of Tension Test Construction	1		7
Peak of Tension Test Analysis	1		7
Pretest Procedures	2		8
Chart Markings	1		8
In-Test Procedures	1		8
Post-Test Procedures	1		8
Polygraph Records and Reports	1		9
Comprehensive Polygraph Procedures	3		9
Annex Total	28		
Polygraph Instrumentation		B	10
Historical Development of Polygraph Instrumentation	1		10
Polygraph Maintenance	3		10
Polygraph Operation	3		10
Other Polygraphs	1		11
Annex Total	8		
Polygraph Related Subjects		C	12
Physiology of the Human Body	4		12
Pharmacology	1		12
Dynamics of Normal Behavior	2		12
Abnormal Psychology	2		12
Legal Considerations	3		13
Presentation of Court Testimony and Briefings	2		13
Annex Total	14		

Body (cont)

Annex Title and Subjects	Hours	Annex	Page
Polygraph Comprehensive Practical Exercises		D	14
Phase I, Conduct of Zone Comparison Technique Polygraph Examinations and Peak of Tension Examinations	15		14
Phase II, Conduct of Modified General Question Technique Polygraph Examinations and Peak of Tension Polygraph Examinations	15		14
Phase III, Conduct of Personnel Screening Polygraph Examinations	8		15
Annex Total	38		
Examinations		E	16
Performance Test Number 1	2		16
Performance Test Number 2	2		16
Performance Test Number 3	8		16
Performance Test Number 4	8		17
Annex Total	20		

Section IV - Annexes

Annex A - Polygraph Examination Procedures

Purpose - To provide the student with a comprehensive review and latest technique developments of polygraph testing principles and procedures.

File No		Clas	Type of Instruction
10100 - Use of the Polygraph in Investigations			
	Hours:	1	U	.5C, .5TV
	Objective:	The student will analyze proper utilization of polygraph equipment as it relates to criminal investigation, to include use of film to preface summary discussion.	
	Ref:	AR 195-6; TB PMG 22; TVR 19-2559.	
10102 - Polygraph Regulations and References			
	Hours:	1	U	1C
	Objective:	The student will analyze current regulations and reference materials to identify requirements governing the conduct of polygraph examinations within the military. He will discuss examiner qualifications and identify his responsibilities, restrictions and limitations imposed upon conduct of examination procedures to be followed.	
	Ref:	AR 195-6; TB PMG 22.	
10104 - Polygraph Question and Test Structure Principles			
	Hours:	1	U	.5C, .5PE
	Objective:	The student will discuss the application of basic polygraph principles and significant considerations involved in the structure of polygraph questions and procedures employed in the formulation of polygraph tests.	
	Ref:	TB PMG 22; Zone Comparison Technique, Backster; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.	
10106 - Semantics			
	Hours:	1	U	1PE

Annex A (cont)

File No | Clas | Type of Instruction

Objective: The student, when confronted with a situation requiring evaluation of semantical considerations involved in the polygraph pretest, will develop questions and construct the test in such a way as to eliminate semantical variables.

Ref: Semantics and Common Sense, Salomon.

10108 - Polygraph Question Formulation

Hours: 2 U .5C, 1.5PE

Objective: The student will apply the principles utilized in the formulation of valid polygraph test questions for subsequent use in polygraph examinations.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; Zone Comparison Technique, Backster.

10110 - Chart Interpretation Fundamentals

Hours: 1 U .5C, .5CS

Objective: The student will discuss and identify the terminology and principles associated with interpretation of phenomena recorded on polygraph chart tracings.

Ref: Truth and Deception, Inbau and Reid; Zone Comparison Technique, Backster; The Keeler Technique, Harrelson.

10112 - General Question Test Construction

Hours: 4 U 2C, 2PE

Objective: The student will construct a general question-type and a modified general question-type polygraph test to be applied in specific testing and personnel screening.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10114 - General Question Test Interpretation

Hours: 2 U .5C, 1PE, .5CS

Annex A (cont)

File No | Clas | Type of Instruction

Objective: The student will discuss and interpret general and modified general question test polygraph charts to determine if the examinee is considered to be deceptive, nondeceptive, inconclusive, or requires further testing.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10116 - Zone Comparison Test Construction

Hours: 2 U .5C, .5CS, 1PE

Objective: The student will discuss principles of test construction and apply them to zone comparison-type polygraph examination.

Ref: Zone Comparison Technique, Backster.

10118 - Zone Comparison Test Evaluation

Hours: 2 U .5C, .5CS, 1PE

Objective: The student will evaluate zone comparison test polygraph charts to determine additional test question construction requirements and procedures.

Ref: Zone Comparison Technique, Backster.

10120 - Peak of Tension Test Construction

Hours: 1 U .5C, .5CS

Objective: The student will discuss principles of structure and application of peak of tension-type polygraph examinations.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10122 - Peak of Tension Test Analysis

Hours: 1 U 1PE

Objective: The student will interpret peak of tension polygraph charts to determine deception, nondeception, or inconclusive results.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

Annex A (cont)

File No		Clas	Type of Instruction
10124 - Pretest Procedures			
	Hours: 2	U	1.5C, .5TV
	Objective:	Through the use of television, the student will analyze and discuss the preparations related to polygraph examinations proper conduct of pretest interviews and other pretest procedures.	
	Ref:	AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; TVR 8-70.	
10126 - Chart Markings			
	Hours: 1	U	.5C, .5PE
	Objective:	The student will discuss the utilization of standardized signs, symbols, abbreviations, and other markings on polygrams to facilitate interpretation and identification.	
	Ref:	Uniform Chart Markings, Backster; The Keeler Technique, Harrelson.	
10128 - In-Test Procedures			
	Hours: 1	U	1C
	Objective:	The student will discuss the considerations related to polygraph in-test procedures to include application of stimulation tests, subject intratest conditioning, test or question modifications, utilization of interpreters, and dealing with exigency situations.	
	Ref:	AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; TVR 8-71.	
10130 - Post-Test Procedures			
	Hours: 1	U	1C
	Objective:	The student will discuss the considerations related to polygraph post-test procedures, including the release of examination results, and the questioning of deceptive subjects.	
	Ref:	AR 195-6; TB PMG 22; Criminal Interrogation and Confessions, Inbau and Reid; The Keeler Technique, Harrelson; TVR 8-72.	

Annex A (cont)

File No		Clas	Type of Instruction
10132 - Polygraph Records and Reports			
	Hours: 1	U	.5C, .5PE
	Objective: Through discussion the student will analyze the utilization of standard polygraph forms, format requirements involved in preparation of polygraph examination reports, and distribution and proper disposition of polygraph charts and records.		
	Ref: AR 195-6; TB PMG 22.		
10134 - Comprehensive Polygraph Procedures			
	Hours: 3	U	1C, 2PE
	Objective: The student will apply current polygraph procedures and principles in a series of simulated test situations. He will be monitored and critiqued by qualified instructors. Subsequent to individual critiques, the student will present unusual charts, test questions, and the results to identify errors and corrective action required.		
	Ref: School material.		
	Annex Total 28		

Annex B - Polygraph Instrumentation

Purpose - To provide the student with a working knowledge of operation and maintenance of polygraph instruments to include familiarization with new instrumentation.

File No		Clas	Type of Instruction

10200 - Historical Development of Polygraph Instrumentation

Hours: 1 U 1C

Objective: The student will analyze the historical development of polygraph instrument recording components. He will discuss the pneumograph, cardiosphygmograph, galvanograph, and kymograph, to include development of modern transistorized instruments.

Ref: A History of Lie Detection, Trovillo; Truth and Deception, Inbau and Reid.

10202 - Polygraph Maintenance

Hours: 3 U 1C, 2PE

Objective: The student will perform maintenance of polygraph instruments to include tests for leakage, checks of sensitivity, procedures for calibration of the instrument, disassembly and assembly of components, and detection and repair of malfunctions performed at the operator and organizational maintenance levels.

Ref: TM 11-5538A; TM 11-6695-200-20P; TM 11-6695-200-35P; TM 11-6695-210-12; TM 11-6695-210-45; Polygraph/Lie Detectors, C. H. Stoelting Co; Keeler Polygraphs T. P. Manual 70.1, Associated Research, Inc.

10204 - Polygraph Operation

Hours: 3 U .5TV, 2.5PE

Objective: The student will operate an AN/USS-2D polygraph instrument. He will be monitored and critiqued by instructors on his operation and procedure.

Ref: TM 11-5538A; TVR 8-70.

Annex B (cont)

File No		Clas	Type of Instruction
10206 - Other Polygraphs			
Hours:	1	U	1D

Objective: Discussion and demonstration on the operation, functions and maintenance of Keeler, Stoelting, and LaFayette polygraphs, emphasizing the variations from the AN/USS-2D.

Ref: TM 11-6695-203-15; TM 11-6695-210-12; TM 11-6695-210-45; Polygraph/Lie Detectors, C. H. Stoelting Co; Keeler Polygraphs T. P. Manual 70.1, Associated Research, Inc; LaFayette Instruments, LaFayette Instrument Co.

Annex Total 8

Annex C - Polygraph Related Subjects

Purpose - To provide the student with a working knowledge of concise and updated information on legal, physiological, and psychological considerations related to polygraph examinations, and to provide a foundation on which to base his preparation for delivering polygraph court testimony and polygraph briefings.

File No		Clas	Type of Instruction
10300 - Physiology of the Human Body			
	Hours: 4	U	2.5C, 1F, .5TV
	Objective: The student will discuss human physiology to include organization, structure, and functions of the nervous, cardiovascular, and respiratory systems in relationship to chart tracing phenomena.		
	Ref: Basic Physiology and Anatomy, Chaffee and Greisheimer; CF, "Gateways to the Mind"; CF, "Hemo the Magnificent"; TVR 8-98631.		
10302 - Pharmacology			
	Hours: 1	U	1C
	Objective: Through discussion, the student will analyze the potential effects of depressant- and stimulant-type drugs on the human body and the resultant polygraph tracings to include narcotics, barbiturates, amphetamines, tranquilizers, and hallucinogens.		
	Ref: United States Pharmacopia, JAMA.		
10304 - Dynamics of Normal Behavior			
	Hours: 2	U	.5C, .5CS, 1TV
	Objective: The student will discuss dynamics of normal behavior in relation to the conduct of polygraph examinations. He will analyze and identify the ego defense mechanisms in reaction to stress situations.		
	Ref: Abnormal Psychology and Modern Life, Coleman; TVR-5142.		
10306 - Abnormal Psychology			
	Hours: 2	U	1C, .5CS, .5TV

Annex C (cont)

File No | Clas | Type of Instruction

Objective: Through an introductory film and a television presentation, the student will analyze and discuss the general classification and characteristics of neuroses, psychoses, character disorders, and other organic and functional disorders of the mind. He will identify abnormal behavior symptoms and other abnormal psychological factors which pose potential polygraph examiner problems in law enforcement.

Ref: Abnormal Psychology and Modern Life, Coleman; TVR 8-73.

10308 - Legal Considerations

Hours: 3 | U | 1.5C, 1CS, .5TV

Objective: The student will discuss the nature of legal evidence produced by a polygraph examination. He will determine the legal status of examination results, the rights of the subject under the provisions of the Fifth Amendment to the Constitution, and Article 31 of the UCMJ. The student will render appropriate advice to a suspect and evaluate admissions and confessions received during or as a result of a polygraph examination administered under military law.

Ref: AR 195-6; TB PMG 22, MCM, 1969 (Rev); CM Reports; TVR 8-70

10310 - Presentation of Court Testimony and Briefings

Hours: 2 | U | .5C, 1.5PE

Objective: The student will discuss the requirements for effective presentation of court testimony by the polygraph examiner, and the principles of delivering effective polygraph briefings. He will participate in simulated courtroom presentations of polygraph testimony, and in simulated briefings.

Ref: School material.

Annex Total 14

Annex D - Polygraph Instrumentation and Examinations

Purpose - With pertinent references and advice and under minimum supervision, the student will demonstrate the knowledge and skill gained from previous instruction during practical exercises; the student will conduct polygraph examinations in varied situations which require the application of recommended principles, techniques, and procedures common to the field of polygraphy at an acceptable standard of performance.

File No		Clas	Type of Instruction

10400 - Phase I, Conduct of Zone Comparison Technique Polygraph Examinations and Peak of Tension Examinations

Hours: 15 U 3C, 12PE

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the zone comparison technique and peak of tension examinations. The student will be expected to apply lessons previously learned and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Criminal Interrogations and Confessions, Inbau and Reid; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; Zone Comparison Technique, Backster; School material.

10402 - Phase II, Conduct of Modified General Question Technique Polygraph Examinations and Peak of Tension Polygraph Examinations

Hours: 15 U 3C, 12PE

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the modified general question technique and peak of tension examination. The student will be expected to apply lessons previously learned and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Lie Detection and Criminal Interrogation, Inbau and Reid; Truth and Deception, Inbau and Reid; School material.

Annex D (cont)

File No		Clas	Type of Instruction
10404 - Phase III, Conduct of Personnel Screening Polygraph Examinations			
	Hours: 8	U	2C, 6PE

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced practical exercises in the conduct of personnel screening polygraph examinations and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; Annual Report on Polygraph Technique Trends ASI, Backster; School material.

Annex Total 38

Annex E - Examinations

Purpose - To provide a meaningful evaluation of each student, to measure student progress and the efficiency of instruction, and to further student learning and assist in providing student motivation.

File No		Clas	Type of Instruction
10002 - Performance Test Number 1			
	Hours: 2	U	2E
	Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will explain the functioning of the instrument, identify the parts of the instrument utilizing correct nomenclature, identify and correct malfunctions, and correctly calibrate the instrument. The test encompasses material presented in 10200, 10202, 10204, and 10206.		
	Ref: School material.		
10004 - Performance Test Number 2			
	Hours: 2	U	2E
	Objective: Under conditions simulating a courtroom and given a hypothetical polygraph examination conducted by the student, the student will present polygraph testimony under both direct and cross examination. This test encompasses material presented in 10310 as the direct object of the test, and generally includes all material covered in the course.		
	Ref: School material.		
10006 - Performance Test Number 3			
	Hours: 8	U	8E
	Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the zone comparison technique and peak of tension technique; the student will be individually critiqued and graded. This test encompasses 10100, 10102, 10104, 10106, 10108, 10110, 10116, 10118, 10120, 10122, 10124, 10126, 10128, 10130, 10132, 10134, 10300, 10302, 10304, 10306, 10308, and 10400.		
	Ref: School material.		

Annex E (cont)

File No		Clas	Type of Instruction
10008 - Performance Test Number 4			
	Hours: 8	U	8E
	Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the modified general question technique. The student will be individually critiqued and graded. The test encompasses material presented in 10100, 10102, 10104, 10106, 10108, 10110, 10112, 10114, 10124, 10126, 10128, 10130, 10132, 10134, 10300, 10302, 10304, 10306, 10308, and 10402.		
	Ref: School material.		

Annex Total 20

CID REGULATION CIDR 195-2

CRIMINAL INVESTIGATION

CID OPERATIONS AND REPORTS

EFFECTIVE 1 AUGUST 1973

HEADQUARTERS, US ARMY CRIMINAL INVESTIGATION COMMAND

JULY 1973

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(2) Positions wherein skills gained as a result of military criminal investigation experience are utilized; for example, employment as polygraph examiner, criminal investigation laboratory technician or examiner, investigative photographer, news photographer, or roving TV cameraman. This does not preclude employment as studio photo laboratory technicians, or similar positions when there is slight chance of public contact, and a minimal risk of imputation of military criminal investigation involvement in civilian activities.

4-8. CONDUCT OF CID POLYGRAPH EXAMINATIONS. a. CID polygraph activities are confined to the investigative stages of an official inquiry and are not to be considered a substitute for a complete and thorough investigation or a procedure for verifying the findings of a court-martial.

*b. Commanders (or acting commanders) of CID regions and the USARPAC Liaison Officer are authorized to approve the conduct of polygraph examinations in connection with criminal investigations being conducted within their areas

of investigative responsibility to include investigations conducted by military police investigators, and those polygraph examinations requested for exculpation purposes. This authority may not be further delegated. The commanders of separate field offices will submit requests for polygraph examinations to the Commander, USACIDC, ATTN: CIDC-R, Bldg 12, Rm 324, Ft Holabird, MD 21219, or to USARPAC Liaison Officer, as appropriate, for approval.

(1) All requests for polygraph examinations in support of MPI operations will be reviewed in accordance with para 1-3, AR 195-6. Following technical review by CRD of the examinations, the examiner will furnish the requesting MPI section a copy of pages 1 and 4 of DA Form 2802, with markings in accordance with para 1-17f(1), AR 195-6.

(2) Other non-CID requests for polygraph examinations will be reviewed in accordance with AR 195-6 to determine the propriety of the request. Para 1-3, AR 195-6, establishes approval criteria. Requests for polygraph examinations for exculpation in non-felony cases may be approved when such action appears to be in the best interest of justice.

c. The conduct by CID polygraph examiners of a polygraph examination of a convicted offender in connection with the offense for which convicted, is not appropriate. Additionally, the conduct of a polygraph examination of witnesses who have testified in the judicial proceedings of a convicted offender is not appropriate for the purpose of verifying their testimony before a court-martial. CID authorizing representatives will not approve, nor will they provide personnel and equipment for the conduct of polygraph examinations as part of a post trial review of court-martial or other judicial proceedings. Requests for exceptions to this policy with appropriate justifications, will be referred to the Commander, USACIDC, ATTN: CIDC-RP.

d. Polygraph examiners will be primarily utilized as such. They will not be assigned duties or investigations to such an extent that it will interfere with their expertise as examiners or the timely and expeditious conduct of examinations.

e. Conduct of polygraph examinations and the processing of associated records will be in accordance with AR 195-6.

f. Data pertaining to polygraph examination results, or a person's refusal to submit to polygraph testing, will not be recorded on chronological Agent Activity Summary (CID Form 28) sheets for permanent record or retention. When such information is recorded by agents within the case file, it will be entered on a separate Agent Activity Summary for retention in the case file not longer than 3 months after close of the pertinent investigation. All agent activity summary sheets and any other record such as CID Report of Investigation-Investigative Information Techniques and Procedures (DA Form 2800-2), containing such information will be destroyed within 3 months following the date of the final report of investigation IAW para 1-7g, AR 195-6.

(1) Following examinations where no CID report of Investigation relates to the incident/examinee, polygraph examiners will forward to CRD the original of the Polygraph Examination-Statement of Consent (DA Form 2801), Polygraph Examination Authorization (DA Form 2805), and Polygraph Examination Report (DA Form 2802) together with the polygraph charts for technical review. The documents and charts will be retained at Crime Records Directorate for permanent file, unless a re-examination is required. In those instances in which a re-examination is necessary, the charts will be returned to the originating agency. In all instances, a letter reporting the results of the review at CRD will be forwarded to the originating agency.

(2) Following examinations in support of a CID investigation, polygraph examiners will forward the original of DA Form 2802 in final form with polygraph charts for technical review at Crime Records Directorate. Should a re-examination be necessary, the polygraph charts will be returned to the originating agency, otherwise the polygraph charts will be retained at CRD for permanent file. In each instance, the DA Form 2802 and a letter reflecting the results of the CRD review will be forwarded to the originating unit.

c. Self admitted homosexuals should be offered a polygraph examination at the outset of the investigation to determine the truthfulness of their admissions. In those instances where an individual claims to be a homosexual, but refuses to provide CID with specific information as to his homosexual activity (associates, places, etc), or other information sufficient to conduct an investigation to substantiate his allegations, CID will terminate its investigation and submit a final report of investigation in accordance with paragraph 3-22, AR 195-2. The agent conducting the investigation will include as an exhibit to the report a detailed statement concerning his interview of the individual and the individual's refusal to provide investigative leads.

d. DA Forms 2800-2, Polygraph Charts, pages 2 and 3, DA Form 2802, when required, will not be included with any report transmitted to a serviced commander or agency listed in c, above.

b. When a polygraph examination report is attached, the following entry required by paragraph 1-7h(1), AR 195-6, will be made in this space on each copy except the original (CRD) copy.

"Attached as Exhibit.....is Polygraph Examination Report (DA Form 2802). Under the provisions of para 1-7g, AR 195-6, this exhibit must be destroyed NLT (enter here date three months [90 days] after date of report shown on final DA Form 2800). The original of this report, to include associated polygraph records, is in the files of the Crime Records Directorate, US Army Criminal Investigation Command, Ft Holabird, Maryland 21219. Reproduction of this exhibit or its contents is prohibited."

e. Neither the results of a polygraph examination which reflect the examiner's evaluation of polygraph tracings, nor any reference to a person's refusal to submit to the examination will be reflected on DA Form 2800, the substantiation section of the report, or in any statement attached to the report of investigation. The conduct of a polygraph examination

and the attachment of exhibits in accordance with AR 195-6 may be mentioned in the substantiation section. Example:

JOINER was administered a polygraph examination by SA Lindley A. LOWE, HQ, Second Region, USACIDC, APO NY 09227.

The refusal of a person to submit to a polygraph examination may only be reflected on DA Form 2800-2 (CID Report of Investigation-Investigative Information, Techniques and Procedures), to be attached only to the original copy of the CID Report of Investigation for the Crime Records Directorate, the region information copy, and the unit file copy. The DA Form 2800-2 will reflect the place and the date the polygraph examination was offered and the name, grade, social security number, place of birth, and date of birth of the person to whom the examination was offered. Explanatory comments concerning the circumstances under which the subject was offered the polygraph examination and any comments he may have made in connection with refusal will be entered on DA Form 2800-2 only. Copies of DA Forms 2800-2 maintained at unit level concerning polygraph activity will be destroyed after 3 months.

*f. Polygraph charts will be forwarded to CRD in accordance with AR 195-6 for review and filing. Polygraph charts will be designated as a not attached exhibit retained at CRD.

ORGANIZATION OF THE
JOINT CHIEFS OF STAFF

JOINT ADMINISTRATIVE INSTRUCTION

JOINT ADMINISTRATIVE INSTRUCTION 2530.4A

OJCS (DAS)
21 September 1965

POLYGRAPH EXAMINATIONS

References: a. DOD Directive 5210.48
b. DOD Directive 5210.8
c. CM-218-64, dated 31 October 1964
d. DJSM 1777-64, dated 3 November 1964

1. Purpose. The purpose of this instruction is to implement the provisions of reference a as they pertain to the Organization of the Joint Chiefs of Staff (OJCS) and to set forth the conditions, policy, and procedures for the conduct of polygraph examinations which may be required of personnel assigned to or employed in the OJCS.

2. Cancellation. JAI 2530.4, dated 13 June 1960.

3. Applicability. This instruction is applicable to all military and civilian personnel assigned to or employed in the OJCS.

4. Policy

a. It is the policy of the Department of Defense (DOD) that polygraph examinations shall not be given to personnel assigned to or employed by the DOD except as provided herein, and then only with the specific approval of the head of the DOD component where an individual is assigned or employed, or his designated representative. The use of the polygraph by any DOD component is not authorized for civilian applicants for employment or civilian employees, in any employment category, as a screening or selection device or as a condition of employment. In addition, the use of the polygraph is not authorized as a routine part of personnel security investigations of such persons.

b. No department or agency shall allow the use of the polygraph for its civilian employees or applicants for employment by another department or agency of the DoD or of another US Government Agency for a purpose inconsistent with these restrictions.

c. Consensual polygraph examinations may be authorized on a case-by-case basis in a specific counterintelligence or criminal case, as presently provided for in DoD Directive 5210.48, "The Conduct of Polygraph Examiners," dated 13 July 1965, and for aliens in accordance with the provisions of paragraphs 3a, 3b, and 3c, DoD Directive 5210.8, "Policy on Investigation and Clearance of DoD Personnel for Access to Classified Defense Information," dated 15 February 1962.

d. No adverse action shall be taken against an individual for refusal to take a polygraph examination or for unwillingness to volunteer to take a polygraph examination. Moreover, the fact that a person's refusal either to submit to a polygraph examination or to volunteer for a polygraph examination shall not be recorded in his personnel file and shall be strictly controlled and protected as provided herein. The continuation of an investigation, however, is not considered to be an adverse action and is not prohibited by this provision.

e. The probing of a person's thoughts and beliefs, and questions about conduct which have no security implication, or are not directly relevant to an investigation, are prohibited.

3. Criminal Investigations. In a criminal investigation, a polygraph examination shall not be conducted unless the following requirements are met:

a. A determination shall be made (to be confirmed in writing) by the Chairman, Joint Chiefs of Staff, or his designated representative, the Director, Joint Staff, and/or the Director of Administrative Services (D/AS), per references c and e, that:

(1) The investigation by other means has been as thorough as circumstances permit, the subject has been interviewed, and consistent with the circumstances of the case, the development of additional information by means of a polygraph examination is essential and timely for the further conduct of the investigation;

(2) The alleged crime is an offense punishable under the United States Code or the Uniform Code of Military Justice by death or confinement for a term of 1 year or more;

(3) There is a reasonable cause to believe that the person to be examined has knowledge of, or was involved in, the matter under investigation.

b. The person to be examined has been advised:

(1) That he has the opportunity to obtain and consult with counsel of his choice prior to the polygraph examination.

(2) Of his rights, in accordance with the provision of either the "self-incrimination clause" of the Fifth Amendment to the Constitution, or Article 31 of the Uniform Code of Military Justice, whichever is appropriate.

(3) That the polygraph examination will be conducted only with prior written consent and that no adverse action will be taken against him because of a refusal to consent to take a polygraph examination.

(4) Whether the area in which the polygraph examination is to be conducted contains a two-way mirror or other device whereby the examinee can be observed without his knowledge; and whether the examination will be monitored in whole or in part by any means.

6. Counterintelligence Investigations; Intelligence Operations

a. Counterintelligence Investigations. Polygraph examination may be conducted as a part of a counterintelligence investigation of DOD personnel, as a part of a personnel security investigation of DOD personnel, or of personnel outside the DOD requiring access to classified defense information, providing the following requirements are met:

(1) A determination shall be made (to be confirmed in writing) by the Chairman, Joint Chiefs of Staff, or his designated representative, the Inspector, Joint Staff, and/or the Director of Administrative Services, per references c and d that:

(a) The investigation by other means has been as thorough as circumstances permit, the subject has been interviewed, and further productive investigative effort is not likely without a polygraph examination; and

(b) The purpose of the investigation is to determine whether to grant, deny, or withdraw a security clearance higher than CONFIDENTIAL; or, in accordance with DOD Directives 5210.7 and 5210.9, initial or continued employment, or membership in the Armed Forces, is clearly consistent with the interests of the national security, and

(c) The information furnished by the individual cannot be checked through the use of other investigative methods.

(d) The person to be examined has been advised:

(a) That he has the opportunity to obtain and consult with counsel of his own choice prior to the polygraph examination;

(b) Of his rights, in accordance with the provisions of either the "self-incrimination clause" of the Fifth Amendment to the Constitution; or Article 31 of the Uniform Code of Military Justice, whichever is appropriate;

(c) That the polygraph examination will be conducted only with his prior written consent and that no adverse action will be taken against him because of a refusal to consent to take a polygraph examination;

(d) Whether the area in which the polygraph examination is to be conducted contains a two-way mirror or other device whereby the examinee can be observed without his knowledge; and whether the examination will be monitored in whole or in part by any means.

b. Intelligence Operations. A polygraph examination may be authorized in the case of an individual who is a principal in an intelligence activity with the specific approval of, or by regulation issued by the head of the DOD component conducting the operation, where information cannot be checked through other

investigative methods; in such cases, the provisions of subparagraph 6a above are not applicable.

7. Conduct of Examinations

a. Nothing in this instruction shall preclude the conduct of a polygraph examination in conjunction with a criminal, counterintelligence, or personnel security investigation, when the individual under investigation or associated with an investigation voluntarily seeks a polygraph examination as a means of exculpation. All such voluntary requests shall be reviewed by the Chief, Security Division, Directorate of Administrative Services (DAS), and the Director of Administrative Services (D/AS), to determine the propriety of the request and to assure compliance with all other requirements of this instruction applicable to examination. The conduct of such polygraph examinations also shall be subject to all the requirements of this instruction for such examinations.

b. Determinations pursuant to subparagraph 5a and subparagraph 6a(1) above shall be made only by the Chairman, Joint Chiefs of Staff, or his designated representative, the Director, Joint Staff, and/or the Director of Administrative Services (D/AS), with advice from the Chief, Security Division, DAS. It is intended that officials selected to make these determinations shall be limited to the minimum possible number consistent with operational necessity.

c. The Chairman, Joint Chiefs of Staff, or his designated representative, the Director, Joint Staff, and/or the Director of Administrative Services is authorized to request that polygraph examination be conducted by the DOD elements which provide investigative support to the OJCS and, in such cases, to the extent applicable shall provide to the supporting DOD element:

(1) In the case of examinations conducted in connection with criminal investigations, the information specified in subparagraph 5a above.

(2) In the case of examinations conducted in connection with personnel security investigations, the information specified in subparagraph 6a(1) above.

d. Information obtained in the course of a polygraph examination shall be strictly controlled.

(1) Polygraph examination results may not be permanently maintained in the OJCS. Copies thereof shall be maintained only in an appropriate investigative file in the Security Division, DAS, and shall be destroyed within 3 months after close of the investigation which included the relevant polygraph examination.

(2) Polygraph examination results shall be available within the OJCS only to the Chairman, Joint Chiefs of Staff, the Director, Joint Staff, and his immediate advisers, and officials expressly charged with responsibility for personnel security and liaison with law enforcement agencies.

(3) Polygraph examination results shall not be made available outside the OJCS except to:

(a) Officials of the Office of the Secretary of Defense or another DOD component, corresponding to those enumerated in subparagraph 7d(2) above and to those officials expressly charged with responsibility for the administration of criminal or military justice;

(b) Other Federal officials, charged with intelligence, security, or law enforcement responsibilities with a clear need to know;

(c) State law enforcement officials where the results indicate an alleged violation of state law, or that a serious crime is likely to be committed;

(d) Legal counsel for the person examined, upon request therefor (subject to provision for safeguarding classified defense information);

(e) Such other persons as the Chairman, Joint Chiefs of Staff, personally may determine.

e. Polygraph examinations will not be given to persons who are not in sound physical or mental condition. Should the examiner or examinee have any doubt as to the physical or mental fitness of the examinee, the matter will be referred to the supervisory official of the component providing the

polygraph services, and the Director of Administrative Services (D/AS), for appropriate action.

8. Exceptions. Individual exceptions to paragraphs 5 and 6 above may be made for cause by the Chairman, Joint Chiefs of Staff. Written notice of such exceptions, including the basis therefor, shall be sent promptly to the Assistant Secretary of Defense (Administration).

9. Responsibility. The Director of Administrative Services is responsible for monitoring all matters pertaining to the utilization of the polygraph within the OJCS; he will keep the Chairman, Joint Chiefs of Staff, and the Director, Joint Staff, informed and will obtain appropriate authority when and as required.

H. O. KIRKLAND, JR.
Colonel, USAF
Director,
Administrative Services

Distribution
Agencies of the OJCS

Mr. MOORHEAD. Thank you.

Now we will proceed to the questioning.

First, Mr. Mondello, in general what number of Government employees are not competitive and hence not covered by your regulation?

Mr. MONDELLO. In very rough terms, I think about 85 to 90 percent of all the so-called 2.6 million that you always hear about from the Civil Service, about 85 to 90 percent are competitive service employees. The balance would be in the excepted service.

Mr. MOORHEAD. Can you give me for the record a description of the excepted service?

Mr. MONDELLO. Yes.

Some employees are completely excepted. In some cases the statutes of Congress keep the Commission from having jurisdiction over employees of a particular agency. Such as in the case of TVA. We don't have the kind of control over the State Department's Foreign Service, for example, as we have over the normal Government agencies.

Also under the Civil Service Act the Commission is authorized to place categories of personnel in excepted areas. For example, all attorneys in the Federal Government—they number some 10,000—regardless of the employing agency are in schedule A of the excepted service. That comes about by virtue of an appropriation rider on the Civil Service Commission's appropriation, which says that the Commission, although it can examine for almost everyone else, cannot examine into the qualifications of attorneys.

This resulted from some difficulty we had back in 1944. But the rider has remained on ever since, and therefore attorneys are in the excepted service. They were placed there by President Truman's directive.

Cooks and chaplains and a variety of other personnel of special sorts are placed in schedule B of the excepted service; these are persons for whom we lack either the capacity or the opportunity to examine as to qualifications.

And that is about the size of it.

There are the so-called political jobs in schedule C. There are noncareer executive assignments deliberately placed away from Commission control because of the fact that they involve some view of the political philosophy of the incumbents. And that obviously is a job that is not here related in our judgment, and belongs outside the Commission's general jurisdiction.

Mr. MOORHEAD. Does the Commission know if excepted employees are subjected to the polygraph testing as a prerequisite for employment?

Mr. MONDELLO. I think ordinarily we would probably find that out. When we go to make our examination into agency records maintained in the security office for security appraisal purposes, the normal thing is for them to accord us a complete view of their files. We just go look where we want to look. We question who we want to question about the running of the office to see that our standards are being met.

What would happen is that our people would go through investigative reports and other files and see if they find any evidence of failure to follow our regulations.

So that if they came upon the paraphernalia that attends a polygraph examination, they would probably raise a question about it, who is this person that you give the exam to, and so on.

When we discovered the rather simple oddity that NASA, which I didn't understand had a counterintelligence mission, although it may have, had polygraph policy instructions, our people just as a matter of natural curiosity began asking some questions about it. That is how come we turned that off, because we don't think they should use the polygraph.

Mr. MOORHEAD. For example, would you have known about the 1973 examination in the State Department that Mr. Gentile described?

Mr. MONDELLO. No, sir, because we don't have that kind—I don't know what our relationship is. I have a memorandum of just what agencies we did take a look at in 1974 fiscal year. And it appears not to include the State Department. There are some 17 or 20 agencies we did take a look at this way. We don't look at every agency every year, we just don't have the forces to do that.

So, I don't know about the State Department, but if we do have a relationship with their security office—and I suspect we do—that would permit us to go over there and make the examination that we do of most agencies under 10450, the Executive order, and had we stumbled on it and deliberately asked the question, have you conducted any polygraph examination, we would have discovered it.

Mr. MOORHEAD. Even though it might be the foreign service officers who—

Mr. MONDELLO. Yes, if it were handled by the security office. I don't imagine they compartmentalize their files on a competitive basis, because ordinarily that doesn't apply to State Department employees anyway.

So I imagine if it were there and our people stumbled on it and asked questions about it, it would have been discovered.

Mr. GENTILE. I can answer Mr. Mondello's question easily.

Friday morning at 10 o'clock a civil service officer will be starting an appraisal of the State Department program. The last appraisal was done in 1967 or 1968.

You are right, the Foreign Service and Civil Service file are mixed together. We don't keep our files segregated. The ones we have polygraphed are Foreign Service. They aren't part of the competitive service. But we have no problem of complying with whatever is needed.

Mr. MOORHEAD. What sort of a case was that? Was it suspected that an employee was leaking information?

Mr. GENTILE. We have a variety of cases. Most of ours are concerned with unauthorized disclosure of foreign intelligence type disclosure which would cause us great concern. If one of our people had been in touch with, say, Iron Curtain type individuals, and we have run down all investigative leads, we can't interview the person at the other end of the line, unfortunately. This is the kind of a case that will end up in a polygraph if the individual is willing.

Mr. MOORHEAD. Mr. Dogin, you mentioned on page 2 of your testimony that the polygraph was particularly useful in a closed group situation where the bank employees would have access, or presumed Government employees would have access.

Mr. DOGIN. That is right, presumably in embezzlement situations.

Mr. MOORHEAD. Has the Justice Department in the Criminal Division ever used the polygraph in that kind of a situation?

Mr. DOGIN. By requesting the Bureau, yes.

Mr. MOORHEAD. You do it through the FBI?

Mr. DOGIN. Yes.

We don't have our own equipment or our own examiners, we usually utilize the Bureau's.

Mr. MOORHEAD. Mr. Herndon, do you agree with Mr. Dogin's statement that it is not such a useful instrument except in the closed group situation?

Mr. HERNDON. Well, I generally concur with that statement. But I would broaden it somewhat, sir, because in addition to bank embezzlement cases, suspect employees on a Government reservation where there is valuable Government property stolen can be tested. We also find the polygraph useful in major cases such as kidnaping, bank robbery and other matters. I believe Mr. Dogin's statement was an example of the type of case in which the polygraph has traditionally been useful; embezzlement cases.

Mr. DOGIN. That is just one type of case.

Let me give you my background. I was assistant district attorney in New York County. I found it useful as an investigative tool in a street crime situation where there was a fleeting observation by a victim in a robbery or in a theft or a stabbing in which there were defense alibi witnesses. We would use it as an investigative tool with the consent of the defendant to interview the defendant and to interview his alibi witnesses.

So we found it pretty useful in that kind of situation. It was never useful to interview or to test the victim, because he may have an incorrect perception of who he saw. So it is really not that useful there, but on the other side.

Mr. MOORHEAD. You mean you need the consent of the defendant to examine the alibi cases?

Mr. DOGIN. No. We need the consent of the defendant to examine the defendant, and the consent of the alibi witnesses to examine the alibi witnesses.

Mr. MOORHEAD. Mr. Herndon, why is the FBI not experimenting with the psychological stress evaluator or the voice analyzer?

Mr. HERNDON. I can answer that question rather briefly, Mr. Chairman.

We historically and traditionally do not use interview tapes or monitoring on interrogations. As you know, this device requires a monitoring by tape recording of the interview. We have a policy in which during our normal interviews throughout the country we do not tape the conversations. Therefore we do not use the PSE device to record and screen the results of the changes in voice modulation. We feel, as a valid reason, that it inhibits both the person being interviewed and the examiner if they both know—as they should know, legally, that this interview is being recorded.

So we find we can conduct better interviews by not having the interview recorded.

Mr. MOORHEAD. I understand that this machine can be used by playing a tape off a recorder. But can't they be used directly in just giving numbers or wiggley lines? In other words, the recording, as I understand it, is not an essential part of it.

Mr. HERNDON. It is our understanding that you need the recording first, and then subject it to additional testing using the PSE device.

Perhaps the recording could be used in national security cases without the individual being aware of the fact that their voice was being recorded. In that case, then, we feel that there are some legal questions or moral questions on which we would confer with the Justice Department. Is this a violation of the defendant's or the witness' rights? So we have avoided using this technique, sir.

Mr. MOORHEAD. You said one thing today that disturbed me; this is at the bottom of page 2. You talked about the polygraph technique in 181 investigative matters, and then you said you checked with the computer and it was up to 191. Do you put the results of polygraph tests into a computer?

Mr. HERNDON. No, sir.

What I keep in my computer—and I have other duties in addition to supervising the polygraph program—I just keep the statistics. Mr. Kelley wants me to keep him advised on a quarterly basis of how many examinations we authorize, how many are declined, and how many examinations are actually conducted during any given period of time.

So I just keep statistical data in the computer, that is all, sir. We want to insure that headquarters is running tight administrative control on the use of the polygraph.

Mr. MOORHEAD. That leads me logically to the next question on page 3 of your testimony, when you talk about proper ethics by the polygraph examiner.

What are proper ethics? Is there a book of ethics to guide polygraph examiners?

Mr. HERNDON. There are a number of publications published over the years relating to the training, and I believe proper ethics. What I meant by that is that the examiner is using techniques which I consider as being ethical and proper, such as not asking sex questions in cases or matters not involving sexual motivation of a crime, or not asking personally embarrassing questions as a control question technique. I think a qualified examiner has got to go in as a skilled interrogator, and not use some techniques which could be considered unethical, such as those two I illustrated.

Mr. MOORHEAD. Mr. Erlenborn?

Mr. ERLENBORN. I have no questions, Mr. Chairman. Thank you.

Mr. MOORHEAD. Mr. Cornish?

Mr. CORNISH. Yes, Mr. Chairman. Thank you.

Mr. Cooke, do I understand that you are only using a polygraph for screening 10 DIA officials in employment?

Mr. COOKE. Approximately 10. The problem there, Mr. Cornish, is this, that in general the employees of the Defense Intelligence Agency are not in the competitive service, they are in the excepted service. However, when DIA was established in 1961, it was an amalgamation of personnel from the military departments, many of whom remain in DIA and some of these are competitive service people. A small handful of these have been detailed outside of DIA to activities under the control of CIA. And those are the ones for which we requested and received the Chairman of the Civil Service Commission's permission for polygraphing.

Now, this is not to say that we are routinely polygraphing the great mass of DIA employees who are in the excepted service. As far as I am aware, the only employees of DIA who may be subject are those who are redetailed to activities outside the operation and control of the

Defense Intelligence Agency. Because as I pointed out, other than those, that small handful, our October 1972 memorandum prohibits the use of the polygraph as a screening device for employment for either competitive or excepted service.

Mr. CORNISH. There are no other agencies, though, where the polygraph is given for employment screening other than——

Mr. COOKE. That is correct, with the exception of the National Security Agency, of course.

Mr. CORNISH. How many tests, polygraph examinations, were conducted in total by the Department of Defense?

Mr. COOKE. Our update of the submission to GAO indicates that for the first three quarters of the fiscal year 1974 there was a total of 5,351 examinations, of which 2,288 involve the NSA screening, and the remainder were by the components of the Department of Defense, the Army, Navy, and Air Force, and they were involved in criminal investigations or counterintelligence investigations, not employee screening.

Mr. CORNISH. One of the things that I find interesting—and this may apply also to Mr. Gentile and even to Mr. Herndon—is that the committee previously recommended that these tests only be conducted in the most serious national security cases or for positions in connection with such jobs. And yet both in the Defense Department and the State Department and in the FBI they are dealing with very highly sensitive matters, I am sure at the highest classifications of government. Yet we find that thousands of tests are being conducted by the NSA and probably by the CIA, but in comparatively few, if any, cases are tests being conducted by the State Department and Defense and the FBI.

I wonder if there is any contradiction there?

Mr. GENTILE. I think one of the big differences, Mr. Cornish, is the fact that we do not use it in State as an entrance on duty requirement—all new applicants being polygraphed. Many other agencies will use it for that.

Mr. CORNISH. I guess the real question is if the NSA uses it for that purpose and the CIA, why wouldn't you expect that the State and Defense Departments and the FBI would be using it for that purpose also? They also deal with highly sensitive matters.

Mr. COOKE. Mr. Cornish, in the first place, in the case of NSA, title 50, section 832 requires, because of the high degree of sensitivity of intelligence sources and methods and cryptologic information that NSA deals with, that all employees as a condition of employment go through a full field investigation.

Now, I don't mean to suggest to you at all that the polygraph is the culmination or the principal device used by the National Security Agency in screening its employees. That is not true. The National Security Agency uses the polygraph as a useful tool, but only a tool in conjunction with a rather intensive full field investigation. They use it with discretion, and only to answer very narrow areas in the background of the prospective employee.

By the way, you said that the committee talked about using the polygraph only in highly sensitive national security cases. It also recognizes the desirability in serious criminal cases as well. And as you know, our directive provides for its use in that type of situation only if the offense is punishable by a year or more, as you have in a felony situation.

Mr. CORNISH. I don't want to put Mr. Gentile on the spot here, but I guess I will.

In a very real sense most of our top political officers in embassies overseas are really in a way intelligence officers, are they not?

Mr. GENTILE. Well, they aren't involved in—such as CIA and NSA—sources and methods. I think this is one of the big distinctions.

Mr. CORNISH. But any government certainly would depend heavily on the reports of its political officers and embassies located overseas for much of its intelligence information.

Mr. GENTILE. Yes, sir. As you probably know, all of our positions are designated critically sensitive, and all people are fully investigated before they enter on duty in the Department. They have a full detailed background investigation.

Mr. CORNISH. In the Defense Department we would find individuals working there in connection with some of the most highly sophisticated and secret types of weapons of war. That certainly would be on a level of importance of the intelligence community.

Mr. COOKE. I would note with respect to Mr. Gentile's remarks, that even though these are important, they do not involve the intelligence sources and methods which the Congress in the National Security Act of 1947 said deserve special protection. That is a different category of sensitivity.

Mr. CORNISH. And in turn, the FBI often deals with a very high level of security involving the movements of foreigners, certain types of foreigners in the United States, and their activities. And that would certainly seem to fit into a very sensitive national security category.

Would you agree with that?

Mr. HERNDON. Yes, Mr. Cornish.

Mr. CORNISH. Mr. Chairman, on this point, it just seems that we have two systems, one where they aren't used and one where they are used.

In your submission, Mr. Cooke—and incidentally, I tried to get through it all before I fell asleep last night.

Mr. COOKE. Let me assure you that by the length of our submission we did not intend to put you to sleep.

Mr. CORNISH. It wasn't the subject matter, it was the time of the evening.

But in any case, you did mention the psychological stress evaluators. You said that one was turned over to the Air Force, as I recall. I am trying to find that.

As a result the Army has dismantled two of the equipments and transferred the other to the Air Force for tests and an application not related to the lie detecting personnel security or investigations.

Do you happen to know what purpose it was?

Mr. COOKE. I do not, but I will be glad to supply it for the record. But apparently it was entirely outside the field of clearances for security. I don't know offhand, but I can find out for you.

Mr. PHILLIPS. Maybe it makes coffee.

Mr. COOKE. It has been claimed to do a number of things, Mr. Phillips, and maybe it can do that, too, although in my judgment they don't have the reliability at this time to be of any use to us.

Mr. CORNISH. I was very interested in the studies, research studies,

which you attached there, and I got very deeply into those at that dark hour of the night. I was quite interested in the one that was submitted by Norman S. Greenfield and Richard A. Sternbach on the detection of deception, to find out how much deception is used by the operator of the machine in the pretest interviews and in attempting to extract confessions and what have you, and that sort of thing.

Have you had an opportunity to study those research papers?

Mr. COOKE. I would prefer, if you are talking about the details of administering a polygraph, to refer your questions to Mr. Robert Brisentine, who is in fact one of the country's leading experts, I believe, on the polygraph.

Would you like to respond to that question?

Mr. BRISENTINE. This study was by Orne, Thackray, and Paskewitz of the University of Pennsylvania in Philadelphia. This was apparently a technique that they used. We neither subscribe to this technique, nor can we say it is valid. He did indicate in his study that they used certain devices to psychologically set an individual to where—actually it was researched to determine if he would lie or not lie at a certain point, or would show responses that were interpreted as lies. But we funded a portion of the study. We did not conduct it within the Department of Defense.

Mr. CORNISH. If a person during this pretest interview, in a moment of great emotional stress, confesses—and as I understand it this sometimes happens—is this recognized as a success for the polygraph machine as such, and is that marked down in the column as a successful——

Mr. COOKE. I think the answer to that is no.

Mr. CORNISH. I think on the other side someone would claim, well, if the polygraph machine wasn't there, and the circumstances weren't as they were, why the confession would never have taken place. So I think you could probably get an argument on both sides. So I am interested in what the Government's view of that is. That isn't regarded as a success for the polygraph?

Mr. COOKE. May I make a point, that the fact that these research studies have in part been funded by DOD, does not mean that we buy the conclusions, or as a matter of fact use some of the techniques that were used by the researcher in his study projects.

We cite those merely as some indication that the polygraph does have a considerable amount of validity and reliability.

Mr. CORNISH. As I understand it, the research, which I think was probably at the instigation of this committee on the reliability and validity of polygraph testing, did go forward, but it was never concluded, is that correct?

Mr. COOKE. That is correct.

Mr. CORNISH. What was the reason for that?

Mr. COOKE. The research proposal——

Mr. CORNISH. I read some of the reasons stated here. I am just interested in knowing more.

Mr. COOKE. The research proposal suggested that there be extensive testing of recruits as a stable test base merely to determine the validity of the polygraph. We decided after consultation with the Assistant Secretary of Defense for Manpower and Reserve Affairs, who is under our directive the departmental authority, that it was highly inap-

propriate even for the laudable purpose of trying to defensively establish validity by this technique, to use our young men and women entering the services for the purposes of the test.

So the proposed method of validation that that joint group suggested we thought was inappropriate for other reasons.

Mr. CORNISH. And that would be rather an expensive proposition, too, wouldn't it?

Mr. COOKE. I think it might well have been. But, it was not that, it was just the idea, even for the purpose of research, of using a control group of that nature.

Mr. CORNISH. The whole thing possibly could turn into a cost overrun. What I am saying is that it turns out to be a bigger project than you thought.

Mr. COOKE. Let me say that our fundamental reason for not continuing that was not the expense but the undesirability of attempting a validation by this method.

Mr. CORNISH. Do you intend to seek new ways, or have you just dropped the matter?

Mr. COOKE. I think some of the research studies that we submitted to you for your consideration, and which were done after the time since the time of the DOD joint group, and in part funded by Defense, examined the problems of validity and reliability of the polygraph itself.

Mr. CORNISH. Mr. Herndon, I was struck by a comment that you made in your testimony where you say:

> The polygraph is an instrument designed to record psychophysiological responses during a carefully controlled interrogation which may indicate deception when properly evaluated by the examiner.

And I would gather the converse is true, too, that it may not.

Mr. HERNDON. That is correct, Mr. Cornish. This is based on all our work with the polygraph over many years. We have on our staff a University of Virginia Medical School psychiatrist who works with us in our school. I think he put it very well in a nutshell, as a psychiatrist and a trained expert, he said:

> The polygraph concept is very sound, and the psychological procedure within the techniques are very sound—the irrelevant-relevant with a control, guilt complex, peak of tension. However, the polygraph takes you halfway there. The man responds. Then you have to have a skillful interrogator interpret this response. This is the area of all the variables—when you are dealing with the human mind, and you are dealing with the psyche that makes it extremely difficult. And that is why we have traditionally stayed away from accurately pinpointing the polygraph's reliability and validity. We don't believe it can be done.

The validity and reliability of the polygraph, Mr. Cornish, has been battled in the courts for years and years. I think that even with all the grants and studies that LEAA is considering now it will go on for years and years. I don't think it will ever be resolved.

Mr. CORNISH. Would you agree with Mr. Dogin where he lists a number of ways in which polygraph examinations might be affected by certain conditions and circumstances, would you agree with that?

Mr. HERNDON. I agree wholeheartedly with his statement of limitations of the technique, wherein they create a situation where it does not become a precise procedure. Yes, sir; I do.

Mr. CORNISH. One of the concerns that I raised here yesterday was sort of a theme running throughout the testimony of the polygraph

proponents. And the theme was that there should be a way that a person can prove himself to be innocent of things. I just wondered, Mr. Dogin, do you know of any court in the United States where a defendant is required to prove his innocence?

Mr. DOGIN. No; the State, the people, or the Government has to prove him guilty beyond a reasonable doubt.

Mr. CORNISH. That is the reverse of the Napoleonic code, am I correct?

Mr. DOGIN. You are correct.

Mr. ERLENBORN. Just because it has relevance to the facts you raised there, let me give you one experience that I had as a young attorney.

Having first had a few years of experience as a prosecutor, I was engaged to defend a young soldier who was accused of indecent exposure in a movie theater. Just one witness accused him, and he was the only witness for the defense. I suggested to him that we go to a polygraph operator to have his story verified. I could show that information to the prosecutor, and very often the prosecutor would take this into consideration and possibly drop the charges.

The only trouble was that my client confessed in the process of being interrogated. I found that very useful to me as an attorney, to find out that he had been lying to me.

Mr. CORNISH. Also one of the witnesses yesterday said he thought it was a bizarre twist of the Constitution if someone were to regard the first amendment as giving a person the right to remain silent. Mr. Dogin, do you find that bizarre?

Mr. DOGIN. Not at all.

Mr. CORNISH. Thank you. That is a very good answer.

Mr. MOORHEAD. Mr. Daniels?

Mr. DANIELS. No questions, Mr. Chairman.

Mr. MOORHEAD. Mr. Phillips?

Mr. PHILLIPS. Thank you, Mr. Chairman. I have a general question addressed to whoever might be in a position best to answer it.

Do you know if files are maintained on the results of polygraph tests on individuals in any agencies represented here? Are these test results maintained in a file? Once an individual has agreed to submit to a test and a test is taken, are those results maintained, or are they destroyed?

Mr. HERNDON. I can speak for the FBI, sir. Our test results are purely in conjunction with criminal or security investigations. Those results are reported by the examiner and do become part of the investigative files. We do not use them for personal screening.

Mr. PHILLIPS. Is that true in State?

Mr. GENTILE. In State it is a part of the security file of the employee who was interrogated.

Mr. COOKE. Mr. Phillips, I refer you to paragraph 7(d) of our governing directive which states the very strict controls we have and the careful maintenance of the files we maintain as the result of polygraph examination.

Mr. PHILLIPS. Suppose another agency were to contact the FBI that has this file and says, so and so has applied for employment—say at the NSA—and they would ask you to check your files to see if a polygraph test had been administered on that same person. Would you make that available to the other agency?

Mr. HERNDON. Normally, Mr. Phillips, we probably would not. In

our procedure of reporting we go along with the court that the polygraph technique and testing procedure is not admissible evidence. A polygraph test opinion is not in the investigative report. The opinion is solely administrative data, on the top of our report and is not normally disseminated to outside agencies. We keep it outside of that dissemination because it is not considered as admissible evidence.

Mr. PHILLIPS. Does anyone know if there is any interagency transfer of this kind of record?

Do you know of any case where maybe DOD has made it available to State?

Mr. Mondello, is there any civil service regulation or policy on interagency transfer of these kinds of files?

Mr. MONDELLO. We indicate in our instructions that what we purport to apply to the competitive service covers as well polygraph examinations made by others. I read—whatever portion it was—that the prohibition applies to the use of the result of polygraph examinations given previously not only by that agency, but by another Federal agency, or by a private source. There is a case—I am hard pressed to remember just where it is at the moment, although I think it is still pending—of an individual who was denied employment—I think it was a policeman, if I am not mistaken—on the basis of a polygraph result that had been made available to Federal people by the State people. I think it is in the State of Virginia some place. That case is currently before the Commission. I don't know that it has been decided. But along the way there will be the issue as to whether indeed, because of our restrictions, anybody can use the polygraph examination.

But that is the only case that I have heard of that presents this matter.

Mr. PHILLIPS. We are concerned with this problem of interagency transfer in connection with legislation that we are marking up involving privacy. That is why I asked the question.

Mr. Cooke, Mr. Mondello in his statement on page 6 refers to a DOD request in June of 1969 for approval of the use of polygraph for competitive civil service.

Such request was denied in July of 1969. Because of your current directive 5210.48, the 1965 directive, the civil service felt it needed to be updated and clarified to make it meet the criteria in the Civil Service Commission requirements.

You say in your testimony that there has been no updating of your directive since 1965. Mr. Mondello also indicates that a second request was made in March of 1973, and such permission was granted. I am wondering why it is that you have not updated your directive in view of the Civil Service Commission denial, which indicates to me that there was almost a 4-year period when there was no approval for such tests in competitive civil service.

I don't know whether you conducted any during that period without approval or not. But since it clearly did not meet the CSC requirements, why has there not been an updating?

Mr. COOKE. Mr. Phillips, we have not updated our directive. Nonetheless, we do have permission from the Chairman of the Civil Service Commission for the 10 or so people in DIA and the competitive service to conduct these tests. There is an exchange, of course, in meetings. The problem was not specifically on this one point, and there was an exchange of views as to how we were proceeding. I can only

observe that apparently from the viewpoint of the Civil Service Commission that the directive, perhaps as modified by the October 1972 memo, is currently judged by the Commission satisfactory to meet the standards for the granting of the waiver.

Mr. PHILLIPS. Is that the case, Mr. Mondello?

Mr. MONDELLO. I regard the October 1972 directive as a great step in the right direction. I don't think it really constitutes the kind of full set of regulations that we would expect the Department to come up with in the course of time.

Mr. PHILLIPS. But you still granted the approval in March of 1973 for 1 year, and now you are reviewing requests for another year's approval?

Mr. MONDELLO. That is right. I want to see the update regulations. I want a full set of regulations, and I think we are going to insist on it. I understand that Mr. Cooke on his part has staff people busy attempting revision of the regulations, and we certainly have a large clearance problem because they are so widespread. I don't know what they are going to do about that. But our reaction, I think, is pretty foreordained. Our appendix says what this has to be by way of a set of regulations; 5210, or whatever that regulation is that they have got, meets our standards in a lot of different ways. But in some ways it falls short. And until they clear that up they are not going to get approval in the future.

Mr. MOORHEAD. Mr. Phillips, will you excuse me for a minute?

The next witness will be Mr. Harold Brownman, Deputy Secretary for Management and Services, Central Intelligence Agency.

Mr. Brownman has asked that the question and answer period of his testimony be held in executive session. To make sure that it is valid, I would like to put that as a question to be voted on while we do have a quorum present.

All those in favor of acceding to the request and holding the executive session for the question and answer period of Mr. Brownman's testimony signify by saying "aye".

[Chorus of aye.]

Those opposed, "no".

[No response.]

The matter is unanimously carried.

Thank you.

Mr. Phillips?

Mr. PHILLIPS. Thank you, Mr. Chairman.

The reason that I pursued this line of questioning was to try to strengthen the Civil Service Commission's insistence on the updating of that directive. And I hope that perhaps this hearing will help in that regard.

Mr. COOKE. Mr. Phillips, may I qualify—the discussions that we are having with the Civil Service Commission, in my judgment—Mr. Mondello may disagree—are not at all germane to this particular problem of certification for clearance. We have differences as to the amount of screening that should be done in investigation for a critically sensitive position. This is entirely apart from the use of the polygraph. We have differences as to the amount of neighborhood checks that should be done, and items of that nature. I am not aware of any differences between the Commission and ourselves with respect to the polygraph.

Mr. PHILLIPS. Couldn't you submit your directive and issue the polygraph section now and defer the other?

Mr. COOKE. The polygraph section, as far as I am aware, is satisfactory. We try in general to keep such areas in one piece of paper rather than a number, because we have literally a 5-foot shelf of directives now.

Mr. PHILLIPS. The thing that bothers me is the 44-month period that took place between June of 1969 and March of 1973, where there was no approval for the use of polygraphs by the Department.

Mr. COOKE. But June 1969 did not relate specifically to the DIA problem at all, it was a general problem of what we did on our security clearances vis-a-vis what the Commission did. In some cases our standards, I think, were higher, and in some cases they were not quite as high as to the amount of neighborhood interviews.

Mr. PHILLIPS. As I read Mr. Mondello's statement, it was approval of the use of polygraphs in the competitive civil service that was involved, am I not correct?

Mr. MONDELLO. Our reluctance so far to grant approval prospectively turns on my estimation—and mind you, I haven't put this question to the Chairman of the Commission yet, but I know what I will recommend—it turns on my estimation that the directive of the Department of Defense could be tightened up to accord more closely with what we set as standards in that appendix. It is not the kind of thing that is easy to resolve here, obviously. And I don't have any difficulty with feeling that—I have known Dr. Cooke to be a very reasonable gentleman, and so I expect we can resolve it in 30 days or 60 days.

Mr. PHILLIPS. Let me put one final question on this subject to Mr. Cooke.

During this 44-month period between June of 1969 and March of 1973 was, in fact, the polygraph used on Defense Department employees?

Mr. COOKE. In the competitive service?

Mr. PHILLIPS. Yes.

Mr. COOKE. As far as I am aware, no.

Mr. PHILLIPS. Just two other questions very briefly, Mr. Chairman.

Mr. Dogin, you testified that the Criminal Division makes use of the FBI polygraph capability in those cases where it is necessary.

Mr. DOGIN. That is correct, sir.

Mr. PHILLIPS. Can you tell me in the Watergate investigation, were there any requests by the Criminal Division to the FBI for the use of polygraph tests on any of the people involved in that investigation?

Mr. DOGIN. I am not specifically familiar, but I think the answer is yes.

Mr. PHILLIPS. Can you tell me how many?

Mr. HERNDON. Perhaps this might be a question really that should properly be answered by the Office of the Special Prosecutor.

Mr. DOGIN. I think so, Mr. Jaworski.

Mr. PHILLIPS. Were any involved in the so-called White House Plumbers operation?

Mr. DOGIN. I don't know, sir.

Mr. HERNDON. Mr. Phillips, I would defer that question also to the Office of the Special Prosecutor.

Mr. PHILLIPS. Mr. Gentile, you said in your testimony that there

were 18 cases in a 10-year period that involved the use of polygraph on State Department employees.

Did that include the tests that were administered on ACDA employees by the CIA in connection with alleged leaks related to the SALT talks?

Mr. GENTILE. No, that does not include it. I am only responsible for State itself and not for ACDA. They have their own security office.

Mr. PHILLIPS. And they are not included in your statistics?

Mr. GENTILE. They are not included in my statistics, no, sir.

Mr. PHILLIPS. Thank you, Mr. Chairman.

Mr. MOORHEAD. Mr. Stettner?

Mr. STETTNER. I have just a few questions on the matter of research, Mr. Chairman.

We had the proponents of the psychological stress evaluator and the voice stress analyzer here yesterday. Their instruments are being researched by a number of component agencies in the Department of Defense. The developers and marketers have been in business approximately 4 years. We find that the Army has contracted out its research, the Air Force has undertaken to do some in-house research. NASA procured some for in-house research. I understand, now, that the Navy has procured a PSE instrument for research. All the components of the Department of Defense so far have expressed dissatisfaction with the instruments, in terms of their primary use.

Is there no way of coordinating the research within the Department of Defense, to insure that it is not duplicative and unnecessarily costly?

Mr. COOKE. Of course NASA is not in the Department of Defense.

Mr. STETTNER. I am sorry, I meant NSA.

Mr. COOKE. We only purchased, I think, a total of seven of these devices. Obviously to get any sort of judgment you need more than one research project. Let me say again that this research is no longer going on, we looked at it and decided that it wasn't useful. I don't regard under the circumstances in an outfit as large as the Department of Defense evaluations by more than one component as unnecessary duplication at all. I think the results tend to reenforce each other, or the research techniques presumably were different among the Department of Defense components. And I think we could be quite properly criticized had we only bought one or two devices and let one component do it. So the fact we tried seven of these machines is perfectly justified under the circumstances.

Mr. STETTNER. Has the Department received any inquiries, to your knowledge, from the Department of Justice in terms of coordination of research that the Department of Justice presently has under consideration?

Mr. COOKE. No; to my knowledge it has not.

Mr. STETTNER. That is all, Mr. Chairman.

Mr. MOORHEAD. Thank you, gentlemen. I certainly appreciate your coming here and helping us. You have made some progress since our first hearing, and we commend you for that progress.

Thank you.

[Questions submitted to the Department of State, Department of Justice, the FBI, the Civil Service Commission (with an excerpt from an accompanying letter), and the Department of Defense, and the replies follow:]

Questions for the State Department

Question 1. In reference checks on present or past employees of State who are now seeking employment with other "intelligence community" agencies, is there any disclosure about (*a*) refusal to take polygraph tests.

Answer. No.

(*b*) Results (general or specific) of the polygraph test?

Answer. Yes.

Question 2. In reviewing test results with the individual tested, why is he told only the general nature of test findings? Wouldn't discussion of specific matters give an opportunity for that individual to give additional explanations for critical items?

Answer. Certainly, anytime the polygraph examination indicates deception in the employee's answer to a specific question or issue, that would be discussed further with him. Questions are so phrased and tests are so administered that the issues to be resolved are as simple and clear-cut as possible. Thus, even when the procedure indicated possible deception, which has been relatively rare in the few cases we have handled, the general nature of the results would still be sufficiently specific to permit reasonable communication in the subsequent interrogation. In the even rarer case of an individual discovered to be emotionally or otherwise unsuitable for polygraph examination, there would be no purpose in covering specific responses. Finally, when the results indicate no evidence of deception, as we find in the vast majority of our cases, a general summary to that effect has been sufficient for the employees so examined.

Replies to the Questions for the Justice Department and the FBI

Question 1. What is the meaning of the phrase "proper ethics by the polygraph examiner"? Are the circumstances of testing such as would allow the examiners' personality or behavior to influence significantly the results of the polygraph test?

Answer. The phrase "proper ethics by the polygraph examiner" was partially explained by two specific examples of improper ethics which Mr. Herndon gave during his testimony on June 5, 1974. Additionally, the use of a very strong accusatory tone and line of questioning, without justification from chart interpretation of significant psychophysiological responses to relevant questions, is considered unethical by the FBI. Certainly all of the standards of lawful criminal interrogation of possible defendants as set forth by the courts in case decisions over the years must be followed in polygraph interviews.

Circumstances of testing which would allow the examiner's personality or behavior to influence significantly the results of a polygraph test are entirely possible. Semantics and question formulation are also very crucial. On the one hand, you could have a hostile accusatory examiner and, on the other, the "friendly" examiner as mentioned in Mr. Dogin's testimony. The friendly examiner could make the examinee feel confident that his deception would not be detected. The FBI feels that a polygraph examiner must be extremely skilled in interrogation and a person who is unbiased, conservative, and as objective as possible within the limitations of the polygraph technique. In any event, however, it should be remembered that the Justice Department and the FBI do not rely solely on polygraph test results in either investigative or prosecutive action.

Question 2. If questions to be asked are routinely reviewed with the individual to be tested, prior to the actual test, how is it possible to develop "new information or investigative direction" as a result of the examination?

Answer. During actual FBI polygraph examinations, only those questions to be asked while the examinee's psychophysiological responses are being recorded with the polygraph are routinely reviewed with the individual to be tested prior to the test. This is to establish complete understanding and meaning of the question (semantics) and to insure that the person tested will not be asked any "surprise questions." In FBI usage, the actual test questions constitute only a relatively small percentage of the total time of the interview procedure. It is during the pretest and particularly the posttest interview that new information or investigative direction is obtained. Again, it must be remembered that the polygraph technique is essentially a carefully planned and controlled interview in which a skilled interrogator is merely using the polygraph chart to open up avenues of further questioning based on the individual's psychophysiological reactions and explanations for these reactions. During the entire procedure, FBI

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examiners are attempting to build a rapport with the examinee in order to ascertain the truthful facts in a given matter. Logically, this takes considerable time, careful probing, and skillful questioning during the entire interview. If a person has been deceiving or withholding information and he becomes aware that this is indicated by his demeanor and polygraph charts, he may admit this and then provide new and truthful information.

Question 3. Why is the person examined not informed by the FBI of the results of the polygraph tests and the examiner's final opinions?

Answer. It is interesting to note that only in very few instances do individuals actually request to be advised of the results of a polygraph test and the examiner's final opinion. This has been found to be true in FBI experience because the person tested certainly knows whether or not he has practiced deception. Long years of experience with the polygraph reveals that generally those who tell the truth and are completely candid and honest rarely ask for the results. Those who have tried to deceive or beat the test occasionally inquire.

During the course of a polygraph examination, the examiner, where appropriate, informs the examinee that he appears to be deceiving with regard to a question or questions. However, in FBI usage, the person tested is not informed of the examiner's final opinion or the results of the examination. In most instances, the examiner prefers and should completely review and study the polygraph charts and his notes prior to submitting his final report. Polygraph data and test results are maintained by the FBI as part of the substantive investigative case file and therefore are of a "confidential nature," as provided by supplement No. 4 (revised) of departmental order 3464. Accordingly, the FBI does not inform the person of the results or final opinion of polygraph examinations, as this is confidential information.

Question 4. Why has the FBI elected to conduct its own training program, rather than arrange for such training to be procured from CIA or the Army's training facility at Fort Gordon?

Answer. The FBI has elected over the years to conduct its own polygraph training when necessary. During the past 10 years, we have conducted only one polygraph examiners' school when we trained 14 additional special agents. In the FBI special agent corps, we have a highly selected source of trainees, and the special agents selected are all highly experienced and recognized as outstanding interrogators. Most have graduate or professional (usually law) degrees and other law enforcement training from previous FBI specialized inservice schools. Subsequently, it is felt that our polygraph training program can be most effectively conducted in a manner specifically tailored to meet the needs of the service within our well-established policies. Additionally, the FBI has been conducting specialized training programs for many years, and we feel that our FBI Academy facilities and faculty cannot be surpassed. We also have access to the faculty at the University of Virginia Medical School and, of course, access to knowledgeable personnel in the Department of Justice.

Question 5. Is it reasonable to conclude that operating costs of the polygraph testing activities of the FBI are substantially understated since they do not include the cost of initial and refresher training, nor the 1-year, on-the-job training, nor any estimates of the salary costs of those who are engaged in such activities (either giving or taking training)?

Answer. The FBI has not furnished operating costs of polygraph testing activities because such costs are not available and no meaningful estimate can be readily obtained. It should be pointed out that there is not one employee presently in the FBI whose sole or even major duties involve polygraph matters. Only a very small portion of the time of the special agents who are also polygraph examiners is actually spent conducting polygraph examinations. During the last 10 years, the FBI has conducted only one full-length training school and two advanced training schools, the latter for experienced polygraph operators. Those who furnish the training are also fully employed in other administrative duties as supervisory special agents in the FBI Laboratory and Training Divisions. A polygraph examination is essentially an interview procedure which is integral with our special agents' investigative duties and responsibilities.

Question 6. What preliminary evaluation of available research (past or present) was done prior to the decision by the Law Enforcement Assistance Administration (LEAA) to fund research in the amount of $100,000 in the area of validity and reliability of polygraphs, the evaluation of practices among examiners, the sources of errors in polygraph examinations, and related matters?

Answer. It has been established that psychophysiological recordings can be

effective in differentiating between truth and deception in mock crime situations in the laboratory, and that the accuracy rate of detection can be manipulated by controlling such variables as age, relevance of the question, degree of motivation of the subject, the number and type of physiological measures being monitored, the number of times the questions are asked, et cetera.

However, the effectiveness of the lie-detection technique when it is used on criminal suspects outside of the laboratory has never been adequately resolved; there is, therefore, a conspicuous lack of reliable data on this point. Polygraph examiners have consistently claimed an error rate of less than 1 or 2 percent. Unfortunately, their claims are unsubstantiated, and their statistics were based upon total cases rather than confirmed cases. Several scientists have examined criminal suspects, and they have unanimously reported accuracies of essentially 100 percent. However, they did not publish many details to support their claims.

It might also be worthwhile to note that the House of Representatives Government Operations Committee in 1965 (H. Rept. 198, 1965) condemned the use of lie detectors in the Federal Government but recommended that the Government "initiate comprehensive research to determine the validity and reliability of polygraph examination" and to "improve the training and qualifications of Federal polygraph operators." This same committee estimated that the Federal Government has spent more than $300,000 for research on various aspects of polygraph testing techniques. The committee reported that none of the agencies contacted was able to satisfactorily demonstrate the validity and reliability of the polygraph.

Question 7. Has LEAA reason to believe that the results of earlier research efforts were either inaccurate, inconclusive, or otherwise unacceptable?

Answer. During the last 50 years, there have been over 75 laboratory experiments which have indicated that psychophysiological measurements can greatly increase the probability of determining whether a subject is lying or not. Unfortunately, there are numerous differences between the detection of deception in a laboratory environment and lie detection with criminal suspects. Some of these differences, such as the degree of emotional involvement which the subject has in the outcome of the examination, are obvious and compelling; other differences are more subtle. Some of these differences favor accuracy with criminal suspects. The qualifications, experience, and testing techniques of the scientists were not at all representative of lie detection as it is being practiced today. Perhaps the major reason for this is that very few scientists have been trained in current lie-detection practices.

Since polygraphs are being used more frequently in the judicial process and are used by the Federal Government, as well as most major law enforcement agencies at State and local levels, it is extremely important that adequate information be available regarding the basic reliability and validity of the techniques. In addition, information is needed about the ways in which the techniques can be improved and the extent to which available techniques are properly employed in present practice. It is the basic purpose of the proposed research by the University of Utah to fill some of the gaps in knowledge concerning those fundamental problems.

Question 8. On what basis was the selection of the proposed researcher (Dr. David C. Raskin of the University of Utah) made?

Answer. An unsolicited concept paper was submitted by Dr. Raskin. Two independent reviewers, as well as LEAA professional staff, examined the paper. As a result of the reviews, LEAA indicated it would entertain a proposal. This, in turn, was reviewed for its soundness in research, methodological design, and qualifications of the researchers (both practical and academic experience). LEAA concluded that the applicant demonstrated considerable knowledge of literature in the field and the proposed research will not be duplicative. Consequently, Dr. Raskin has been recommended for funding.

Question 9. What are your views on the advantages that could accrue if responsibility for polygraph examiner training were to be assigned to one agency, consolidated at one or two locations, and standardized as to length, course content, and examining techniques?

Answer. In view of the above comments and the fact that each agency using the polygraph has different functions and responsibilities with unique objectives in its polygraph program, the FBI does not believe that consolidation and standardization would be advantageous.

U.S. CIVIL SERVICE COMMISSION,
OFFICE OF THE GENERAL COUNSEL,
Washington, D.C., July 12, 1974.

* * * * * * *

I am also enclosing responses to the eight questions which you had posed in your June 18 letter. In this regard, I would like to point out that the Commission's instructions regarding the use of the polygraph were first promulgated by Federal Personnel Manual letter 736–4 on October 25, 1968, and were incorporated into the Federal Personnel Manual (chap. 736, app. D) on January 31, 1972. Only once since 1968 has the Chairman of the Commission approved a request for the use of the polygraph. On April 17, 1973, approval was granted for 1 year to the Department of Defense. The Department has requested a renewal of the authority, but approval is being delayed pending receipt of the Department's revised directive on the use of the polygraph, which now must be approved by the Chairman.

I also wish to point out that present Commission instructions relate only to the use of polygraphs with regard to employees in the competitive service. Our Bureau of Personnel Investigations is presently studying the possibility of expanding these instructions to include excepted service positions as well.

* * * * * * *

Sincerely yours,

ANTHONY L. MONDELLO,
General Counsel.

Enclosures.

QUESTIONS FOR CIVIL SERVICE COMMISSION

Question 1. What knowledge is routinely available to the Civil Service Commission about the number of "lie detection" tests administered by agencies each year, and the types of circumstances in which the tests are resorted to?

Answer. The Civil Service Commission does not receive any type of information as to the numbers of polygraph tests administered each year by the agencies. The approval granted to the Department of Defense did reflect that about 10 Defense Intelligence Agency employees would be tested, but no other numbers were given. The approval did reflect the circumstance under which the tests might be administered, e.g., CIA, DIA, NSA interface on highly sensitive intelligence or counterintelligence projects.

Question 2. Has the Commission prescribed any periodic reporting of this type of data, for those agencies whose requests to administer such tests it has reviewed and approved? For those agencies having a highly sensitive intelligence or counterintelligence mission directly affecting national security?

Answer. The Civil Service Commission has not prescribed any reporting requirement of those agencies where approval has been granted to administer tests. Neither has the Commission attempted such a requirement from agencies with highly sensitive intelligence or counterintelligence missions such as the CIA or NSA (Excepted service).

Question 3. Which agencies, other than the CIA and NSA, are using polygraph tests as a preemployment screening procedure?

Answer. It has been reported at a hearing of this subcommittee that the Department of Defense and Department of State also use the polygraph in pre-employment screening.

Question 4. Is the manner in which CIA and NSA (or others) administer such tests a matter of concern and considered by the Civil Service Commission as part of its program for evaluating agency personnel management practices?

Answer. As mentioned previously, it has become a matter of concern, and we are studying the possibility of including the Excepted Service in the regulations.

Question 5. How many Federally-operated or funded schools are there providing training in use of "lie detection" equipment and how many civilians or military personnel are trained each year at Federal expense?

Answer. It is unknown how many Federally operated or funded programs or schools are operating which give instruction in lie detection equipment. Similarly, it is unknown how many personnel are trained for such operation each year.

Question 6. Is there any degree of uniformity of training (i.e., length of course, course content, prerequisite qualifications, cost of training, etc.)?

Answer. The training given is unknown to the Commission.

Question 7. In what respect were NSA's policy and regulations on the use of polygraphs found by CSC to be unsatisfactory, and what changes were required of that agency?

Answer. The regulations do not reflect that they are not to be used for personnel purposes. Also they allow for the results to be freely disseminated to other Federal agencies on a "need to know" basis. The agency was instructed to rewrite the regulations to prohibit the use in the personnel screening process or to disseminate the results of the test to any outside agency, unless it is to be used in the course of a criminal prosecution or an investigation of intelligence or counterintelligence matters.

Question 8. Do you have any opinion on why some sensitive agencies, such as the CIA and NSA, need to use polygraphs for preemployment screening while other sensitive agencies, such as the State and Defense Departments and the FBI, do not?

Answer. NSA, along with other agencies of the Department of Defense, does use the polygraph. Apparently NSA and CIA feel that the additional facts disclosed by the use of the polygraph are worth the extra effort. Also it is generally accepted that agencies which use the polygraph have reduced the security/suitability risks to a minimum by surfacing all potentially derogatory information early in the investigation so that nonselection decisions can be made, or the investigation expanded to cover the additional information.

Questions for the Department of Defense

Question 1. What internal procedures are there to insure that different components within the Department of Defense are not duplicating one another's research efforts or funding duplicative research into polygraph or psychological stress evaluator testing?

Answer. The Department of Defense polygraph supervisory officials meet monthly to discuss research as well as other operational techniques of the polygraph. This, coupled with an interchange between the research elements of the DOD components precludes redundant research relating to polygraph. Additionally, our directive prescribes that any research related to polygraph, to include other instruments for evaluation of truth and deception, must be approved by the OSD Comptroller.

Question 2. What is the position of the Department with respect to the comments by Dektor Counterintelligence and Security, Inc., that a report recently submitted, under an Army contract, is critically deficient, and that—

(*a*) award of the contract suggests ignorance, at best, on the part of the contracting agency;

(*b*) performance by the contractor met neither the specifications nor the objective of the contract;

(*c*) results and conclusions appear to be invalid because they are based on insufficient scientific controls;

(*d*) public funds expended should be returned, on the basis of noncompliance;

(*e*) there should be a public disavowal by the Army of the report?

Answer. The research conducted by the Department of the Army contract regarding the psychological stress evaluator–1, was carefully considered prior to its authorization, and was conducted with the knowledge of Dektor Counterintelligence and Security, Inc. The performance by the contractor met the specifications and its conclusions depict that the objective was reached. The scientific controls utilized during this particular analysis appear to be valid in all respects.

Question 3. The Army, with about 70 percent (285) of all the polygraphs in the Department of Defense (390), administered about 2,000 of the 6,300 tests given in 1973. NSA, with only 14 polygraph machines, administered about 3,100 tests, and reports 12 certified examiners, 7 of whom did this work as primary duty. In contrast, the Army reports 70 certified examiners, only 9 of whom did this as their primary duty. What are your observations on these disparities?

Answer. Generally, NSA polygraph examinations are centralized and pertain only to personal security testing; whereas, within the Military Departments it is necessary to disburse examiners to strategic locations throughout the world. Additionally, the Military Departments have a criminal investigative mission often requiring the timely use of the polygraph procedure. This Department's response of May 9, 1974, stated that the Army has 32 polygraph examiners whose duties primarily pertain to the administering of polygraph examinations.

See answer to question No. 7 as regards number of instruments owned by the Department of the Army.

Question 4. Would you explain to the subcommittee the original justification for the acquisitions by the Army, Air Force, and NSA of their psychological stress evaluators—3, 1, and 2, respectively—as well as the nonuse by the Army and NSA and the high-incidence use by the Air Force?

Answer. The psychological stress evaluators were procured by the DOD components for test and evaluation purposes involving both mechanical and operational aspects. The device was used by NSA and Army as well as the Air Force for test purposes. The apparent difference in figures reported may stem from the fact that the Army and NSA laboratory tests were not considered as being usage of the equipment. These acquisitions and tests were conducted in accordance with the provisions of DOD directive 4210.48.

Question 5. What plans exist for future use of these psychological stress evaluators by any DOD major component wishing to perform research with these instruments?

Answer. (*a*) The two psychological stress evaluators provided to the Department of the Air Force are to be used as part of a DOD-approved research project relating to physical security and intrusion detection systems.

(*b*) The question as to the use or disposition of other psychological stress evaluators in the Department of the Army is the subject of a detailed inquiry initiated by the Office of the Secretary of the Army. When the results of this inquiry are available, they will be provided to the committee.

Question 6. What is the explanation for the relatively large number of polygraphs owned by the Air Force, compared to the number of tests administered? Why are there so many certified examiners although none has this as a primary duty?

Answer. (*a*) The Air Force initial acquisition of the instruments was based on the disbursement to each regional operating location so that examiners did not have to carry an instrument with them at all times. In 1970, the Air Force changed its system to require individuals to carry their own individually assigned instruments. Excess instruments were maintained as backups or for repair parts for the ones in use in the field. Plans to eliminate excess instruments in the Air Force inventory are being effected at this time.

(*b*) Up until July 12, 1974 the Air Force had assigned polygraph duties as an additional duty which permitted timely administration of examinations. Due to program revisions in the DOD directive, the Air Force is planning to go strictly to primary duty polygraph examiners and will be assigning primary duties in that area resulting in a future cut of over 50 percent of the present AFOSI DOD-certified examiners as well as a 50- to 75-percent cut in the equipment.

Question 7. Reconcile the number of Army-owned polygraphs reported to GAO in November 1973—285—32 at Fort Gordon School; 51 at military intelligence units; 58 at USACIDC; and 144 inoperable in the Army Materiel Command inventory—with your June 5, 1974, submission showing a total of 416 Army-owned polygraphs, of which 140 are inoperable and 276 presumably operable.

Answer. The report to GAO in November 1973 did not include the inoperable polygraphs stockpiled by the Department of the Army while the June 5, 1974 report to your committee reported all polygraphs owned by the Department of the Army. The difference of 144 inoperable polygraphs according to the November 1973 report versus the 140 inoperable in the most recent report was based on the repair of four instruments. The Army has disposed of 74 polygraph instruments that were procured prior to 1960 and efforts are underway to reduce the stockpile even further. The majority of the Army polygraph instruments were procured prior to the committee hearings of 1964. As the instrumentation has not changed appreciably since 1960, it was considered feasible from an economical standpoint to retain instrumentation that cost $740 when replacement of a like item is presently procured at approximately $1,450.

Question 8. Has the Department of the Navy ordered or procured a psychological stress evaluator recently from Dektor Counterintelligence and Security, Inc.?

If yes, what efforts were made by the Navy to satisfy its stated requirement by acquiring one of the units dismantled by the Army or declared surplus by NSA, to avoid unnecessary expenditures of Federal funds?

Answer. (*a*) A Navy component in Florida did purchase one psychological stress evaluator; however, this acquisition was not in compliance with appropriate DOD directives or naval instructions. The Navy Department has no plans for utilizing that psychological stress evaluator. The psychological stress evaluator involved has been disposed of to the Defense Property Disposal Office, Jacksonville, Fla., for appropriate disposal.

(*b*) The psychological stress evaluator located in the Navy Patuxent River Center is being tested for possible use with respect to combat and flight-related stress situations. It is not used for investigative case purposes.

Question 9. What are your views on the advantages that could accrue if responsibility for polygraph examiner training were to be assigned to one agency, consolidated at one or two locations, and standardized as to length, course content, and examining techniques?

Answer. It is our view that advantages are presently being accrued from the consolidation of polygraph examiner training within the Department of Defense and that the training facilities of the Department of the Army Military Police School, a designated DOD facility for this purpose, have been utilized by students from other executive departments and agencies. As you may know, by far the largest amount of polygraph examinations are conducted by two Government agencies: The Department of Defense and the Central Intelligence Agency. We do not believe, at this time, that additional consolidation of training facilities is indicated. Within the military departments all certified examiners are trained at a single facility using standardized techniques as well as standardized courses as to content and duration.

Mr. MOORHEAD. The subcommittee would now like to hear from Mr. Harold L. Brownman, Deputy Director for Management and Services, Central Intelligence Agency.

We are pleased to have you with us, Mr. Brownman, and you heard by the vote taken that we will accede to your request about the executive session.

STATEMENT OF HAROLD L. BROWNMAN, DEPUTY DIRECTOR FOR MANAGEMENT AND SERVICES, CENTRAL INTELLIGENCE AGENCY

Mr. BROWNMAN. Yes; I appreciate that, Mr. Chairman.

Mr. MOORHEAD. The direct testimony will be in open session; it will be only the question and answer period when we go into executive session.

Mr. Brownman, could you summarize your statement? We are running out of time.

Mr. BROWNMAN. Before I go to the formal statement, I would like to take the opportunity to set the record straight, if I may.

On the 17th of April we informed this committee, in response to its questionnaire, that the CIA did not possess and did not use psychological stress evaluators. We assumed by that phrase that you were referring to the general field of voice analysis. To keep the record straight, on the 24th of May 1974 this agency procured a Mark II model voice analyzer from Mr. Frederick Fuller at a cost of $3,500. We are looking at this device prior to a firm decision as to whether to engage in any serious research.

Mr. MOORHEAD. It is good to have the record clear.

Mr. BROWNMAN. If you would like to speed this up, I can summarize it.

Mr. MOORHEAD. If you want to make a particular point, go ahead.

Mr. BROWNMAN. There are a couple of particular points. And let me make them very rapidly.

Mr. MOORHEAD. And without objection the entire statement will be made part of the record.

Mr. BROWNMAN. That will be excellent, sir.

This is a bar chart [showing chart] which shows a bit of history over the last 10 years. It is interesting to note—let's take the year 1964 as a specific example—security disapprovals for staff employment numbered 152 in that year. Of the 152, 134 were either triggered by or totally substantiated by the use of polygraph. And that pattern is throughout the period of time. This is one of the types of research study that we continue to perform in the Agency both directly in the agency and with a contractor, to evaluate our results and see if we see any trends. And I believe the key point that this chart shows is that the polygraph is a very useful adjunct to the security screening process for staff employment at the CIA.

Mr. PHILLIPS. Mr. Chairman, could that chart be made a part of the record? I think it would be very useful to our study.

Mr. MOORHEAD. Can you do that?

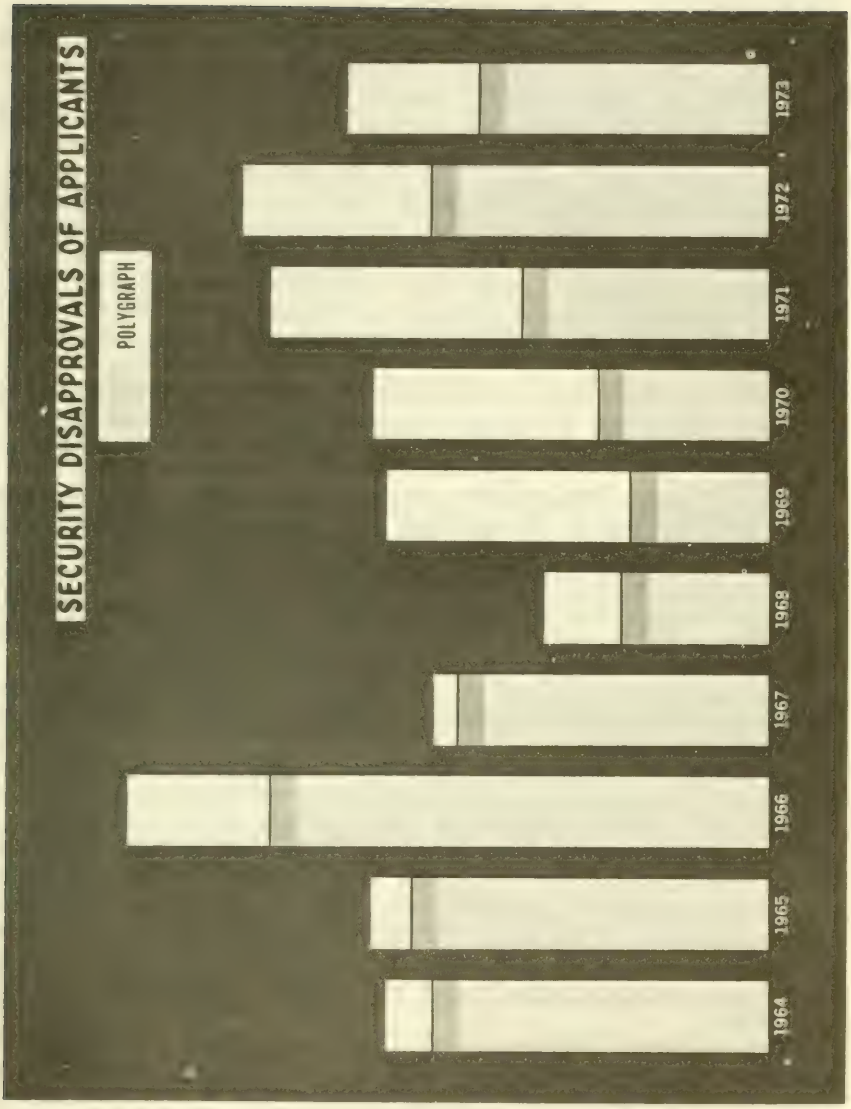
Mr. BROWNMAN. Yes, sir.

Mr. MOORHEAD. Without objection it will be done.

Mr. BROWNMAN. We will provide that for you.

Mr. PHILLIPS. Thank you.

[The bar chart referred to follows:]


SECURITY DISAPPROVALS OF APPLICANTS
POLYGRAPH
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973

Mr. BROWNMAN. As a key point, and being sensitive to some of the questions I heard previously, the issue about polygraph records, after the completion of the polygraph examination, these are maintained apart from the regular security records. These are not included in the security file of the individual, pass or fail, they are separate and isolated records.

They are not now, nor are they contemplated to be, put into any computer storage device. Polygraph information is released only to appropriate Agency officials when it has a direct bearing on a decision to be made by that official. Polygraph acquired information can only be released outside the Agency after a determination has been made, which is approved by the Director or Deputy Director of Central Intelligence, that such a release is necessary in the interest of national security.

Another key item that I would like to stress is that in the framing of the questions for the polygraph examination we do take cognizance of age of the individual, sex, as well as some of the background material.

Before a person undergoes a polygraph examination his consent is obtained in writing. If an applicant asks, he is told if the polygraph examination is being monitored or recorded. Occasionally we will record or monitor a polygraph examination.

The individual, prior to being polygraphed, has been interviewed by the Office of Personnel, the Offices of Medical Services, and a major portion of the background investigation has been completed.

As a matter of fact, the background investigation could lead to specific questions on the polygraph examination where clarity or confirmation is required.

The examiner's instructions have been prepared in sensitive question areas to insure that persons undergoing polygraph interrogation are not subjected to questioning about irrelevant, unwarranted, or trivial matters. The interview is not used to probe a person's thoughts about conduct which has no security implications—for example, religious beliefs, practices, and affiliations; opinions regarding racial matters, political activities, or organizational affiliations of a nonsubversive nature—and since last night, I might add, one wonders what that means—and personal views concerning proposed or existing legislation.

I feel it appropriate here to make three basic points. The polygraph examiner makes no recommendation as to the security suitability or status of the person tested. The polygraph report is evaluated as but one element of the total investigative record. At no time is security action taken solely on the basis of the polygraph chart.

About the research program, we have a very aggressive research program. I think I might read this.

Moving from procedures into the research area, you recall that one of this committee's primary recommendations was that a program of research on polygraph be undertaken to investigate the validity and reliability of the procedure. We are conducting such a program.

Reliability, defined as consistency of interpretation of polygraph charts, has been looked at by means of examiner agreement studies. Agreement figures from our studies are comparable to figures from

similar studies of other groups interpreting data germane to their specialties.

On the other hand, validity—or the degree to which polygraph charts measure what they purport to measure—has been a more difficult issue to evaluate. Satisfactory independent criteria for validating real life conditions are scarce, and the differences in polygraph subject attitudes between real life and laboratory conditions have prevented much headway through laboratory experiments. The data so far available have not been disappointing, but they are limited, and we still lack an appropriate scientific base for any conclusions.

We also investigated validity in the sense of utility—the degree to which the polygraph program does what it is intended to do. As you can see from this chart, in each year since 1964 a significant number of security disapprovals of applicants who were processed to the point of the polygraph interview has been due to the polygraph portion of our security processing.

Alternative sensors have been evaluated—for example, a more sophisticated electrodermal sensor; impedance rather than mechanical sensors; electromyography; electroencephalography; microvibration; electro-oculography; pulse-wave velocity; and cardiotachometry. We can generally state that while many of these alternatives show some promise, they have not shown sufficient practical promise to cause us to modify our present instrumentation. This does not close the door on new parameter research. This is a continuing process.

We have shifted to a different model of polygraph instrument than the one we were using at the time of the last hearing, and we feel it is mechanically superior. We are continuing to evaluate new instrumentation as it becomes commercially available, and we are continuing our own search for improved instrumentation.

We have developed a computer system which was utilized heavily in the previously mentioned studies of reliability and of mathematical modeling of examiner performance. We were also, naturally, interested in determining the computer system's practical utility as an additional parameter to actual polygraph operations. Utilizing all that was learned during the evolution of our experimental arrangement, we have full specifications for constructing a dedicated computer system to assist the examiner in chart interpretation. We are now in the process of evaluating the cost-effectiveness of the dedicated computer system.

Preliminary efforts have been undertaken in the field of countermeasures to polygraphy. We have plans for a long-range systematic program studying the possibilities in this field, but of course results are not yet available on these studies.

Voice analysis has drawn our attention. We have been interested in this field for several years, and have been monitoring research in this area conducted by other institutions. We do not believe that research to date has been exhaustive or conclusive and, accordingly, we are planning our own analysis of its possibilities. This project is still in its developmental state.

That, I believe, would conclude my statement.

[Mr. Brownman's prepared statement follows:]

PREPARED STATEMENT OF HAROLD L. BROWNMAN, DEPUTY DIRECTOR FOR MANAGEMENT AND SERVICES, CENTRAL INTELLIGENCE AGENCY

Mr. Chairman, members of the committee, the Central Intelligence Agency is happy to be of all possible assistance to the committee and its staff concerning the CIA's use of the polygraph. This opening statement has been prepared with that thought in mind. However, we believe that an executive session of the committee for the ensuing question period will permit us to more freely respond since we may have to touch upon classified matters in satisfaction of your questions. May we request, Mr. Chairman, that the question and answer period of this hearing be held in executive session.

The CIA is familiar with the recommendations of this committee which were made in its 10th report, including the recommendation that an interagency committee be established to study problems posed by the Federal Government's use of polygraphs and to work out solutions to those problems.

In the years 1964 to the present, the CIA has attempted to comply with your recommendations and with the spirit of the recommendations made by the interagency committee.

The CIA, as an agency with an intelligence mission, uses the polygraph in its applicant security screening program. All positions in the Agency are sensitive within the criteria established in Executive Order 10450. All full-time, permanent employees of the Agency possess top-secret clearances.

The Director of Central Intelligence has put out a directive governing our use of the polygraph. Under the terms of this directive, a copy of which has been provided the committee, the Director of Security is responsible for the supervision and training of polygraph examiners and for the conduct of the polygraph program of the CIA. He is charged by the DCI with the responsibility of insuring that the highest standards of operating procedures and equipment capability are established.

The polygraph is used in the CIA as an aid to investigation for determining the security eligibility of persons for employment by or assignment to the Agency; staff-like access to sensitive Agency installations; utilization in operational situations; or continued access to classified information where implications of a security nature or investigative information require clarifying security interviews.

The polygraph is not used on official or administrative matters involving possible malfeasance, or for the sole purpose of determining violations of the criminal laws of any country.

If a polygraph examination involved a question pertaining to the violation of a criminal law, the individual would be informed of his privilege against self-incrimination and his right to consult with legal counsel or other professional assistance prior to the examination. Notification of such rights would be formally recorded.

Each applicant for employment is notified, at the time he is given application forms, of the intent to use a polygraph examination in the course of his employment processing. A copy of this form has been provided to this committee.

He is told, before testing, the general content of all questions which he will be asked. The questions, since they are couched in broad terms, are discussed carefully with the applicant and the examiner works with the applicant to tailor the question to his/her age, sex, and background. All the testing procedures are explained.

Before a person undergoes a polygraph examination, his consent is obtained in writing.

If an applicant asks, he is told if the polygraph examination is being monitored or recorded.

Before an applicant is polygraphed, he has been interviewed by representatives of the Office of Personnel and Office of Medical Services. A security field investigation has also been initiated. Guidance from the Office of Personnel and the medical staff is routinely provided to the Office of Security if any information has been developed as a result of their screening procedures that might preclude the advisability of conducting a polygraph interview.

The Director of Security is responsible for establishment of adequate safeguards designed to prevent unwarranted invasion of privacy.

All questions must have specific relevance to the person being polygraphed, and to the purpose of that particular test.

Examiner's instructions have been prepared in sensitive question areas to insure that persons undergoing polygraph interrogation are not subjected to

questioning about irrelevant, unwarranted, or trivial matters. The interview is not used to probe a person's thoughts about conduct which has no security implications; for example, religious beliefs, practices, and affiliations; opinions regarding racial matters; political activities or organizational affiliations of a nonsubversive nature; and personal views concerning proposed or existing legislation.

The Director of Security maintains separate files for information obtained during polygraph examinations. By separate we mean separate from security files as well as separate from personnel files and, of course, we do not put any polygraph derived information on computers or in computer data banks. Polygraph information is released only to appropriate Agency officials when it has a direct bearing on a decision to be made by that official.

Polygraphed acquired information can only be released outside the Agency after a determination has been made, which is approved by the Director or Deputy Director of Central Intelligence, that such a release is necessary in the interest of national security.

I feel it would be appropriate here to make three basic points:

The polygraph examiner makes no recommendation as to the security suitability or status of the person tested.

The polygraph report is evaluated as but one element of the total investigative record.

At no time is security action taken solely on the basis of the polygraph charts.

Moving from procedures into the research area, you recall that one of this committee's primary recommendations was that a program of research on polygraph be undertaken to investigate the validity and reliability of the procedure. We are conducting such a program.

Reliability, defined as consistency of interpretation of polygraph charts, has been looked at by means of examiner agreement studies. Agreement figures from our studies are comparable to figures from similar studies of other groups interpreting data germane to their specialties.

On the other hand, validity—or the degree to which polygraph charts measure what they purport to measure—has been a more difficult issue to evaluate. Satisfactory independent criteria for validating real life conditions are scarce, and the differences in polygraph subject attitudes between real life and laboratory conditions have prevented much headway through laboratory experiments. The data so far available have not been disappointing, but they are limited, and we still lack an appropriate scientific base for any conclusions.

We also investigated validity in the sense of utility—the degree to which the polygraph program does what it is intended to do. As you can see from this chart, in each year since 1964 a significant number of security disapprovals of applicants who were processed to the point of the polygraph interview has been due to the polygraph portion of our security processing.

Alternative sensors have been evaluated—for example, a more sophisticated electrodermal sensor; impedance rather than mechanical sensors; electromyography; electroencephalography; microvibration; electrooculography; pulse-wave velocity; and cardiotachometry. We can generally state that while many of these alternatives show some promise, they have not shown sufficient practical promise to cause us to modify our present instrumentation. This does not close the door on new parameter research. This is a continuing process.

We have shifted to a different model of polygraph instrument than the one we were using at the time of the last hearing, and we feel it is mechanically superior. We are continuing to evaluate new instrumentation as it becomes commercially available, and we are continuing our own search for improved instrumentation.

We have developed a computer system which was utilized heavily in the previously mentioned studies of reliability and of mathematical modeling of examiner performance. We were also, naturally, interested in determining the computer system's practical utility as an additional parameter to actual polygraph operations. Utilizing all that was learned during the evolution of our experimental arrangement, we have full specifications for constructing a dedicated computer system to assist the examiner in chart interpretation. We are now in the process of evaluating the cost effectiveness of the dedicated computer system.

Preliminary efforts have been undertaken in the field of countermeasures to polygraphy. We have plans for a long-range systematic program studying the possibilities in this field, but of course results are not yet available on these studies.

Voice analysis has drawn our attention. We have been interested in this field for several years, and have been monitoring research in this area conducted by other institutions. We do not believe that research to date has been exhaustive or conclusive and, accordingly, we are planning our own analysis of its possibilities. This project is still in its developmental state.

In conclusion, it should be made clear that we feel this committee, in looking into polygraph procedures, has performed a very useful function. It has stimulated much-needed research by our Agency and has made us take a careful look at our procedures. And now, Mr. Chairman, may we request executive session for the question-and-answer period?

CENTRAL INTELLIGENCE AGENCY,
Washington, D.C.

APPLICANT INFORMATION SHEET No. 1

To all persons applying for employment with the Central Intelligence Agency:

Your signature to this paper is the first step in applying for employment or consultant status with the Central Intelligence Agency. No application may proceed beyond this first step if the applicant is not in agreement with the conditions stated below:

General considerations

1. The National Security Act (50 USC 403), which created the Central Intelligence Agency as of September 18, 1947, places upon the Agency the responsibility:

(*a*) "To advise the National Security Council in matters concerning such intelligence activities of the Government departments and agencies as relate to the national security;

(*b*) "To make recommendations to the National Security Council for the coordination of such intelligence activities of the departments and agencies of the Government as relate to the national security;

(*c*) "To correlate and evaluate intelligence relating to the national security, and provide for the appropriate dissemination of such intelligence within the Government * * *;

(*d*) "To perform, for the benefit of the existing intelligence agencies, such additional services of common concern as the National Security Council determines can be more efficiently accomplished centrally;

(*e*) "To perform such other functions and duties related to intelligence affecting the national security as the National Security Council may from time to time direct."

The special character of this national responsibility requires the Agency to maintain special employment criteria which may be different from the employment standards of other Government departments and agencies. It follows that the investigation of applicants, which is prerequisite to their employment, is a time-consuming process. It includes, in addition to loyalty and security checks, an evaluation as to competence, physical and emotional fitness, and a determination that a suitable position exists.

2. This comprehensive review may result in a determination that an applicant is not to be offered employment. Frequently, such determination would not be the result of any single event or element in the applicant's personal background or qualifications but would reflect the composite results of the several evaluations involved. In any event, determinations by the Agency are conclusive and final, and no statement of specific reasons is made to the applicant.

3. It should be understood by each applicant that appointments are extremely competitive and that not everyone who is investigated or considered is finally employed. Employment by the Central Intelligence Agency is not a right upon which an applicant can insist. Any offer of employment is subject to full security clearance and does not constitute a commitment of employment on the Agency's part. Applicants must realize that a substantial portion of those who apply are not offered employment even though only a few are rejected for security reasons.

Statement of understanding and agreement

I have read, understand, and agree to the foregoing General Considerations. I have also seen and read Applicant Information Sheet No. 2.

_____

(Signature of Applicant)

APPLICANT INFORMATION SHEET NO. 2

1. In accordance with its special national responsibilities, the Central Intelligence Agency is obliged to judge carefully the suitability of each person selected for employment in the Agency. To assist in this determination, an extensive investigation, which includes a polygraph interview, is conducted with regard to the loyalty, background, and character of applicants under consideration for employment with the Agency. This investigation includes, but is not limited to, inquiries concerning:

(*a*) Professional competence;

(*b*) Any behavior, activities or associations which tend to show that the individual is of questionable character, discretion, integrity or trustworthiness;

(*c*) Any deliberate misrepresentations, falsifications, or omission of material facts;

(*d*) Any criminal, infamous, dishonest, immoral, or notoriously disgraceful conduct, habitual use of intoxicants to excess, drug use or abuse, or sexual perversion;

(*e*) Physical fitness;

(*f*) An adjudication of insanity, serious mental illness, neurological disorders, or emotional instability;

(*g*) Any facts which furnish reason to believe that the individual may be subjected to coercion, influence, or pressure which may cause him to act contrary to the best interests of the national security;

(*h*) Commission of any act of sabotage, espionage, treason, or sedition, or attempts thereat or preparation therefor, or conspiring with, or aiding or abetting, another to commit or attempt to commit any act of sabotage, espionage, treason, or sedition;

(*i*) Establishing or continuing a sympathetic association with a saboteur, spy, traitor, seditionist, anarchist, or revolutionist, or with an espionage or other secret agent or representative of a foreign nation, or any representative of a foreign nation whose interests may be inimical to the interests of the United States, or with any person who advocates the use of force or violence to overthrow the Government of the United States or the alteration of the form of Government of the United States by unconstitutional means;

(*j*) Advocacy of use of force or violence to overthrow the Government of the United States, or of the alteration of the form of Government of the United States by unconstitutional means;

(*k*) Membership in, or affiliation or sympathetic association with, any foreign or domestic organization, movement, group, or combination of persons which is totalitarian, Fascist, Communist, or subversive, or which has adopted, or shows, a policy of advocating or approving the commission of acts of force or violence to deny other persons their rights under the Constitution of the United States, or which seeks to alter the form of Government of the United States by unconstitutional means;

(*l*) Intentional, unauthorized disclosure to any person of security information, or of other information, disclosure of which is prohibited by law, or willful violation or disregard of security regulation; and

(*m*) Performing or attempting to perform his duties, or otherwise acting, so as to serve the interests of another government in preference to the interests of the United States.

2. The Central Intelligence Agency's standards require strict interpretation of the above and other relevant factors in considering applicants for employment. In the event an applicant is in doubt as to whether anything in his background may disqualify him, he is at liberty to describe the matter in writing, place it in an envelope bearing only his name and marked "Confidential Disclosure" and forward it with his application.

Mr. MOORHEAD. Thank you, Mr. Brownman.

The subcommittee will now go into executive session.

I will ask our guests to leave us.

[Whereupon, at 11:50 a.m., the subcommittee went into executive session.]

[NOTE.—The CIA, after reviewing this testimony, agreed to publication, with certain deletions.]

Mr. MOORHEAD. Will you introduce the others?

STATEMENT OF HAROLD L. BROWNMAN (Resumed), DEPUTY DIRECTOR FOR MANAGEMENT AND SERVICES, CENTRAL INTELLIGENCE AGENCY; ACCOMPANIED BY GEORGE L. CARY, LEGISLATIVE COUNSEL; SALVATORE CIANCI, OFFICE OF THE DEPUTY DIRECTOR FOR SCIENCE AND TECHNOLOGY; PAUL RICHTER, OFFICE OF THE DEPUTY DIRECTOR FOR MANAGEMENT AND SERVICES; AND CHARLES PHALEN, OFFICE OF THE DEPUTY DIRECTOR FOR MANAGEMENT AND SERVICES

Mr. BROWNMAN. There is Mr. Charles Phalen of the Office of Security. And Mr. Paul Richter of the Office of Security, who is liaison with Dr. Cianci from the Office of Research and Development. This is George Cary, Legislative Counsel.

Mr. MOORHEAD. What level of classification is this? Maybe you won't know that until after we have finished.

Mr. BROWNMAN. I presume it will be secret. If we get into a problem, we will flag it; but I doubt it.

Mr. MOORHEAD. Is there anything, Mr. Brownman, that you would like to tell us, now that we have gone into executive session, that you didn't want to put in your public statement?

Mr. BROWNMAN. No, sir, I don't think so. I think the public statement is pretty complete. What we have avoided in the public statement, except for the one chart, is numbers which are essentially related to the size of the Agency, and items of that sort. There may be budgetary numbers that you would like. And instead of volunteering all those numbers, we might respond to them selectively. We avoided cost figures in the public statement.

Mr. MOORHEAD. I was curious about your statement on page 3, that if the applicant asks, he is told that he is, has been monitored or recorded. If you go that far for an applicant, why not tell applicants even though they don't ask that they are being recorded?

Mr. PHALEN. The reason for this is to not unnecessarily upset an applicant or unnecessarily bring this into his consciousness at the time of the interview. It is not an effort to keep it away from them. In the case of most of them, this doesn't cross their minds. They are not conscious and curious about it, and we try not to interject any other element as far as their feelings are concerned. Certainly we have no intent to conceal it.

Mr. MOORHEAD. Of the tests that you give the applicants, is there a difference between a secretary, a researcher and someone who will be engaged in covert operations?

Mr. PHALEN. Yes, sir. A covert operations test is tailored to that particular individual and the covert operation that he will go into. There is no set format for that type of test. For applicants there is a basic set format.

Mr. MOORHEAD. Does the polygraph give you any clue as to whether an applicant who is being considered for covert operations is of suitable personality and character for that type of assignment?

Mr. PHALEN. The polygraph interview in its entirety, that is, the eliciting, the testing, the physiological reactions, his own reactions, his oral reactions, the observations by the examiner both before and after the test. Yes. Absolutely. But not just the polygraph charts themselves.

Mr. Moorhead. Let me ask a question about the chart. You show the total number of applicants rejected. And the green part is the one where the polygraph helped you to make a decision to reject him.

Does the white part of the chart mean that the person was subjected to polygraph and passed with flying colors, but you still didn't trust him?

Mr. Phalen. It can be any mix that you set up. Primarily the white portion represents people when our own internal indices check; the national agencies (which would include the FBI); or our own investigation has brought up the disqualifying information. There could be, as you move on and polygraph this person, there could be some of this disqualifying information that we would be aware of, it could be supplemented and enhanced and highlighted by the polygraph information. So that if I am answering your question, if this is responsive to what you are asking, the polygraph portion, that green portion, is either solely material which has never come to our awareness before, that has come to our awareness for the first time during the polygraph, or second, there are hints or indications in these other sources that we have called upon which are then brought out by the polygraph, and the polygraph-acquired information again becomes the predominant reason for the disqualification.

Mr. Moorhead. Could there be outside that green section people who were polygraphed and passed the polygraph test but were still rejected?

Mr. Phalen. Absolutely.

Mr. Moorhead. So the chart doesn't tell us too much really about that; it merely tells us that a certain number took the polygraph test and were not accepted.

Mr. Brownman. Mr. Chairman, as a matter of fact, the chart is not intended to show the infallibility of the polygraph.

Mr. Moorhead. I realize that. You might very well have rejected or passed somebody that you shouldn't have.

Mr. Brownman. Yes, sir.

Mr. Moorhead. I am concerned about this—I would like to get a little explanation about this computer system.

What do you put in the computer? What is your objective? I am talking about page 6 of your testimony.

Mr. Cianci. In this instance, sir, the computer is not used in the classical sense. This was used for data analysis only. And on the basis of various analytical programs, and experimental ones that we developed, we attempted to classify the physiological responses. That is the only material that goes into the computer. In fact, this computer doesn't exist. The experimental portion was handled at a contractor facility. We do not have an internal dedicated computer system for categorizing, classifying polygraph charts. The nature of the output of that system, should we pursue this further and move in that direction, would be, the computer would print an output stating the level of stress for any given epoch on the polygraph chart. And that level of stress really translates back to historic data with this kind of signal, with this kind of physical characteristic.

Examiners in the past assigned a stress classification to it with such and such a probability. And that is all it is. It is just simply numbers. The analog traces are digitalized and then converted into a probability statement about stress.

Mr. BROWNMAN. If I may add to that, Mr. Chairman, perhaps you are familiar with the technique in the medical field where people look at EKG wave forms, digitalize them, and put them in a computer, and categorize certain unique characteristics of wave forms as a certain type of heart disease or heart affliction. This is an extension or an adaptation of this technique, but related to the output of a polygraph device.

Mr. MOORHEAD. Then for an applicant who is either accepted or rejected, could you get his polygraph record out of the computer?

Mr. BROWNMAN. No, sir.

Mr. MOORHEAD. It is not tied to that?

Mr. BROWNMAN. No, sir. We will not store, nor do we ever intend to in terms of our intended thinking, polygraph data which the applicant related in any computer system.

Mr. PHALEN. That is why we use the word "dedicated computer" in our presentation, that is the sole purpose of this computer. But it doesn't exist at this point. I want to stress that.

Mr. MOORHEAD. But how do you protect yourselves from John Jones, who applies and is rejected and comes back 5 years later and applies again?

Do you just run the test all over again, or do you have a record to pull out on John Jones?

Mr. PHALEN. We maintain a polygraph file, as we said, separate from the security file and separate from the personnel file in a special vault area solely for polygraph files. So that we would have a record of that man for a reasonable period of time.

Mr. MOORHEAD. Mr. Cornish?

Mr. CORNISH. Thank you, Mr. Chairman.

Mr. Brownman, do I understand that every single member of the staff of the CIA has undergone this initial polygraph examination?

Mr. BROWNMAN. Except for the Presidential appointees. And in that case I guess it only refers right now to General Walters, since Mr. Colby, the director, had been polygraphed previously in his other assignments.

Mr. CORNISH. Do you make periodic polygraph tests on employees after the initial one?

Mr. PHALEN. We have a reinvestigation program which is cyclical, and it is based as closely as we can make it on a 5-year cycle. In the course of that 5-year cycle we send out another questionnaire to the individual and ask him to update his data. We also conduct a field investigation updating what we have in our security files. When all this is put together there is a determination whether or not this is something that would require a clarifying interview.

Now, this clarifying interview could be just a straight interview, just asking him, or it could be that we might think that a polygraph would be helpful, and also the individual occasionally thinks that a polygraph might be helpful, particularly where the information comes from an area where we can't reach by our investigative processes.

For example, some overseas areas where people do spend much of their lives.

This is getting to your question. We polygraph, I would say, no more than one to five people a year under that arrangement. So my short answer to your question is, we do not polygraph people as part of our reinvestigation program, that is, periodically. It is only at the

time that something comes up in the course of our reinvestigation which we feel requires clarification, or it would be helpful if we could clarify it. The number is almost minimal.

And second, I think we should stress that it is completely voluntary. We do have people who have said, I do not wish to take a reinvestigation polygraph. We have accepted this. We have asked them why. And they are all still employed, and there is no record of this in their personnel files or in their security files.

Mr. CORNISH. That is an interesting observation you made there, an interesting point, on people, after taking an initial one, when it comes up for a security check again, they would prefer not to do it. You asked them why, you say?

Mr. PHALEN. That is right.

Mr. CORNISH. What is the reason generally given?

Mr. PHALEN. One of the reasons is—and it fits many of them—is that their career has been outstanding, and their life is relatively an open book. And, of course, in our relatively closed society of the intelligence community it is quite a bit of an open book. And on that basis they would prefer not to go through it. Of course, some of this is a hangover from questions that have been asked in the past which were a little too broad. Frankly, our earlier approaches to screening might have been a little too broad, and evoked responses in rather personal areas which we don't go into any more.

And this possibly is a feeling from that earlier time.

We have refined our questions down—and I can go into some examples there if we wish where we do not do that any more—this would be an example, that a person says he would rather not go through it. Occasionally they have touched on their own personal philosophy, the integrity of themselves. They would prefer not to subject themselves to this.

Mr. CORNISH. So actually it sort of divides itself into two categories. One is, look, I have got a proven record here, and second, there are certain things that I don't want to be probed too deeply on. Would that be a fair statement as to their reasons for rather not having polygraph tests?

Mr. PHALEN. Yes.

Mr. CORNISH. You stated that the only two people that you didn't polygraph or that aren't required the polygraph are the two Presidential appointees.

Mr. BROWNMAN. Yes.

Mr. CORNISH. So we have a case, once again, where all the Indians are required to march into the tepee but not the chiefs. Is that correct?

Mr. PHALEN. That is not an unusual situation.

Mr. CORNISH. Here are actually the important people in the agency; and yet they don't have to undergo the polygraph.

Mr. BROWNMAN. In our case right now the Director of Central Intelligence has been polygraphed.

Mr. CORNISH. But if he had not been, he would not have been required to go through this?

Mr. BROWNMAN. That is right.

Mr. CORNISH. Do you find any contradiction in that at all, or see any contradiction?

Mr. BROWNMAN. No, sir.

Mr. CORNISH. You don't?

Mr. PHALEN. We feel there would be if you cut down a few levels and began to pick up Deputy Directors, yes. But I think at that level it is reasonable.

Mr. CORNISH. I am interested in why you don't see any contradiction in that. Here are the two top people in the Agency, and they don't have to undergo a polygraph screen.

Mr. BROWNMAN. But these are gentlemen who have undergone other things that the Indians haven't undergone.

For example, they have been subjected to Senate confirmation, and the investigative process related to that. And so I think it is just a different process to perhaps get into the same building. But Presidential appointees have undergone investigative activities out of the White House, the Senate hearings, the confirmation of the entire Senate. This puts them in a vastly different category than the rest of the people in the agency.

Mr. CORNISH. So this would cover what, the Director and the Deputy Director?

Mr. BROWNMAN. Yes, sir.

Mr. CORNISH. The Deputy Director is generally the Director's alter ego, isn't he?

Mr. BROWNMAN. Yes, sir.

Mr. CORNISH. I can't help but draw certain comparisons between the situation in Germany where one of the closest aides of the German Prime Minister turned out to be a no-goodnik, shall we say? And yet—well, it is conceivable that this could happen here, couldn't it?

Mr. BROWNMAN. It certainly is. There is a small but finite probability, yes, sir.

Mr. CORNISH. That is the contradiction I see in the thing.

Let me ask you this. You mentioned that when you have females being given the initial employment polygraph examination that a policy is not in effect that there will always be someone monitoring those?

Mr. BROWNMAN. Right.

Did I state that correctly?

Mr. PHALEN. In the first place, we have somebody monitoring on a roving basis all the time. We have a man whose only job is—he is a supervisor, he is a man that has been with us about 20 years—his job is to sit there and rove through the spectrum, in other words, as a control, to make sure that there is nothing going on that we are not aware of.

Mr. CORNISH. He is a monitor?

Mr. PHALEN. That is right. That is monitoring.

Now, as far as recording, in other words, actually taking it—that is what I think you are addressing yourself to.

Mr. CORNISH. But it is always done in the case of females; certain care is given to female applicants in this regard, am I correct?

Mr. PHALEN. Yes.

Mr. CORNISH. When did this policy start?

Mr. PHALEN. It has been in effect since we started testing females, I would say, years ago.

Mr. CORNISH. The reason I am bringing this up, this wasn't brought on by the testimony of former Congressman Gallagher before the sub-

committee in which he related the experience of a young female applicant for a job at NSA, was it? Do you recall that?

Mr. PHALEN. I recall generally the case, yes.

Mr. CORNISH. But it is not as a result of that?

Mr. PHALEN. No.

If you want to get into the female category—would you like to develop that a bit, as far as our reaction to testing females.

Mr. RICHTER. Before we go on, let me break in and indicate something a bit here. I am not quite sure what has happened in this recent conversation. But we don't routinely record females; we did for a while. And I know when you were with the shop the last time through it was standard. That is not the case now. And I just mentioned that to you, it didn't seem critical, but I am surprised to see that cropping up now.

Mr. PHILLIPS. Is that part of the reaction to women's lib?

Mr. RICHTER. You mean the recording or the cessation of recording? At any rate, neither of them has been a reaction to women's lib. It turns out that this was no particular reason to have done so. We originally went into that for protection in case there were complaints from young females about having been mistreated or insulted or frightened during the interview. And they just didn't complain.

Mr. CORNISH. That was brought out in the testimony, yesterday—and I know you were here, because I saw you—that some of the abuses that are frequently mentioned are in relation to the examination of females.

Mr. RICHTER. That left me kind of confused, too. I don't know what the basis was for that statement. Was it Mr. Backster, or who was it?

Mr. PHILLIPS. It was in the Senate hearing.

Mr. CORNISH. It also stems from some of my own investigations of the polygraph.

Mr. PHALEN. This is what we did, feeling the same way and following it at the last hearings. We had a woman of mature years, a charming woman who was in the process of raising three of her own teenaged girls at the time, and she talked to every female that was examined by us for a period of something like 4 years, she talked to over 2,000 of them, every single one—I will throw this one qualifier, under 25, every female under 25. And we finally stopped this, because in the course of that time there was never a single person examined, female, that complained to her or brought up a problem as far as her test was concerned. That was the only reason she was there, was to talk to each one of these and to draw them out—and she could, she was very good at this—to draw them out and try to identify for us and isolate for us such things as, should we have female examiners.

We also have done spot checks on people who have left the tests. There have been some 2,000. We have asked them the question, among others, would they rather have a male examiner or female examiner or what have you. The percentage of females that have asked for a female examiner is infinitesimal. The percentage of females that say they would prefer a male examiner is preponderant. This doesn't mean we have closed the doors as far as a female examiner, we still are looking for one. But the reason we haven't, our examiners have to be flexible, they have to be both overt and covert, they are both domestic and overseas, they serve both here and overseas, on a TDY basis and

on a permanent basis. We haven't found a woman that was flexible enough to adopt this life. But we are searching. But I think we have gone into what troubled us, and we haven't any isolated problem.

Mr. CORNISH. One final question.

I don't know, Mr. Brownman, whether you were in the room when I was questioning the witnesses from Defense and State and FBI.

Mr. BROWNMAN. Just at the tail end.

Mr. CORNISH. But anyway, I was trying to reconcile something in my own mind there. In any case, these three agencies, I think you will admit, handle all very highly classified material, very sensitive material, and much of it related to national security. And yet they don't see the need for preemployment polygraphs. I think in the case of one witness there were only 10 people screened by the polygraph. And they have a special defense intelligence agency function which may have some relation to your agency, I am not sure.

But in any case, those were the only ones. Everybody else, regardless of what they were doing, working on atomic weapons, or in the most sensitive political intelligence coming through the political officers of the embassy, et cetera, they are not subjected to these employment screening examinations. I understand that the NSA personnel are and your personnel are. And I am asking, why is it necessary for your people and NSA people to go through this process, but not Defense, State, and the FBI?

Mr. PHALEN. I think what we are reaching for there is staff-like access. It is not the level of clearance or the amount of information they are getting or the sensitive information, because we don't, for example, polygraph our contractors, who do get all the information that is necessary for them to carry out their contract, which is [deleted] top secret information.

The dividing line comes when a person gets into an environment where he has what we called staff-like access, where he mixes with our covert component. We can't divide up our building so that you can't intermingle. And you do go from place to place. You are accepted—we are trying to get it so that everybody is even and you are accepted and we know that the security levels are even across the board. If we began to pick and choose—and we thought of this—a question of equity which you raised earlier comes through. We did it one time for all our communications people; we used to test them every time they went out and every time they came back. They began to feel, and I think rightly so, that there was a little bit of an imbalance coming up here. And we could apply this to some of our other covert operations.

So it is the staff-like access where everybody can mingle together, that's the test. And it is not the level of information or the sensitive information or the clearance by the agency, that is not part of it. But that is our philosophy.

Mr. CORNISH. I would say just as a postscript that many of these officials in Defense, State, and the FBI would be vulnerable to the same type of thing that your people would be, certainly, in the way of blackmail and control and what have you.

Thank you.

Mr. MOORHEAD. Mr. Phillips?

Mr. PHILLIPS. Just three very brief areas of questions, Mr. Chairman.

Do you share any of the results of the polygraphs of your employees with other agencies?

Mr. BROWNMAN. No, sir.

Mr. PHILLIPS. There is no interagency transfer?

Mr. BROWNMAN. We cannot transfer.

Mr. PHALEN. We can't, until the DCI approves it. This is a normal process. Release would have to go to the DCI for his signature. It is conceivable that if there was a national security issue or something very critical it might not, but otherwise it would have to go through that very formal process.

Mr. BROWNMAN. Has it happened before?

Mr. PHALEN. I would guess six times in the last 4 years.

Mr. PHILLIPS. To get an idea of the scope of your operation, how many full-time operators, polygraph operators, do you have?

Mr. PHALEN. [Deleted.]

Mr. PHILLIPS. Where are they trained?

Mr. PHALEN. They are trained internally. And that is one of the reasons Mr. Richter is here. He is the man who personally trains them, and we try for an internal one-on-one situation.

Mr. PHILLIPS. Because it is a unique kind of situation?

What types of instrument do you use—or have you found more effective, to put it that way?

Mr. PHALEN. We have all Stoelting Deceptographs.

Mr. PHILLIPS. I referred earlier in a question to Mr. Gentile of the State Department as to the polygraph tests that were administered by CIA on ACDA employees—you are shaking your head.

Mr. BROWNMAN. I think that is a slight inaccuracy.

Mr. PHILLIPS. This would have been 2 or 3 years ago.

Mr. BROWNMAN. We may have lent them an operator and equipment, and they supervised the testing of the individual. We did not. This is just like lending somebody your car. It was our operator and our equipment, and they took them and they supervised them and they managed the operation. The CIA did not.

Mr. PHILLIPS. They supervised the framing of questions and all that?

Mr. BROWNMAN. Yes, sir. And the evaluation process.

Mr. PHILLIPS. Is this a common occurrence? Do you do this for other agencies on request?

Mr. PHALEN. Only State Department.

Mr. PHILLIPS. I was wondering if you had been asked to do anything like this in connection with the Watergate investigation.

Mr. PHALEN. No.

Mr. PHILLIPS. Have you ever come across a situation where an employee in his preemployment screening has passed his polygraph tests and then you later discovered that he was less than reliable—in other words, is it possible for a pathological liar or a potential double agent to beat the test?

Mr. PHALEN. Yes; it is possible for a normal human being, yes.

Mr. PHILLIPS. What percentage, can you estimate based on your experience how often that occurs?

Mr. PHALEN. The only way we know how common it is, is by eventually finding out that there was something wrong. But what the rest of

it is, I don't know. But as far as our finding out subsequently that something is wrong, it is almost infinitesimal, it would be below 1 percent, much lower than that, very unusual. But the rest of it is unknown.

Mr. MOORHEAD. We will have to adjourn now. It occurs to me that there was nothing very classified that came out.

Mr. PHALEN. We didn't know what questions you were going to ask.

Mr. MOORHEAD. I realize that. But if we can clear it——

Mr. BROWNMAN. I think we would like to review the transcript and then clear it.

Mr. MOORHEAD. On that basis the subcommittee will adjourn until next Tuesday, when we will commence the telephone monitoring phase of these hearings.

Thank you for your cooperation, gentlemen.

[Questions submitted to the CIA and the replies thereto follow:]

QUESTIONS FOR THE CENTRAL INTELLIGENCE AGENCY

Question 1. What is the nature of research by CIA into the subject of polygraph testing and have inquiries been made to DOD to ensure that there is no duplication of that department's research effort?

Answer. The CIA's polygraph research effort was comprised of an internal data collection program and an external experimental program. The internal program's goals were: (a) to develop a technology to objectively measure and classify the polygraph signals and (b) to assess the utility, reliability and validity of the polygraph to the Agency in its security practices for employment screening. The external program examined: (a) new sensors; (b) alternate modes of question presentation and/or subject response; and (c) various analytic techniques for chart interpretation. The external studies also addressed the issues of reliability and validity.

The external research effort was coordinated with DOD through attendance at meetings of the Joint Services Group established by the DOD to monitor research. Though the data base of the internal research program was not shared with the DOD members, they were kept apprised of technical developments and problems.

Question 2. What are the results of the research already performed, and what research is currently under way or planned for early performance?

Answer. Though Agency sponsorship of the external research effort was often classified, the work itself was not and the bulk of it has been placed in the public domain through reports in professional and scientific journals. The decision to publish or not was left to the principal investigators who conducted the studies. By and large, the studies demonstrated that: (a) there is a rational and scientific basis for polygraph; (b) the polygraph is an effective detector of stress (though clearly not infallible); and (c) while several new sensors showed promise, none was sufficiently so to warrant changes.

The results of the internal research program are based on data pertaining to Agency operations and they therefore have not been disseminated to DOD elements generally. NSA has been briefed on the internal program.

The current research effort will examine techniques to identify attempted countermeasures. This program was only recently undertaken and there are no results thus far.

Question. 3. Are there any peculiar training requirements for CIA polygraph examiners that require an in-house training program, separate from those of the FBI or the Army?

Answer. This question must be answered in three parts.

(A) There are no peculiar training requirements that require an in-house training program separate from those of the FBI or the Army when training is considered to be limited to familiarization with the mechanical aspects of instrumentation, instrument operation and chart interpretation.

(B) For our needs, the training of an individual must be integrated into a closely supervised, carefully progressive on-the-job program before a determination can be made that he is qualified. We can only do this in-house.

(C) There are also peculiar training requirements which indicate the advisability of a CIA in-house training program when the full scope of application

of the polygraph program in CIA is considered. CIA polygraph officers are also intelligence officers and they are required to support the clandestine foreign intelligence operations of the Agency by testing foreign agent assets. This concept is worked into the training program, from the very outset of training, as an integral part of the procedure. Interview formats, test construction, and recommended procedures for the varied situations involved in agent testing are assembled from training materials and charts derived from actual agent interviews. Ethnic and cultural considerations are woven into the training program from its inception so that CIA examiners are offered a totality of preparation for all ranges of possible work experience. Further, CIA polygraph officers are provided courses in intelligence trade craft, operational procedures, and counterintelligence activities. It has been CIA experience that non-CIA polygraph training has not served to satisfy the overall needs of the CIA polygraph program.

Question 4. Are individuals who undergo polygraph tests told of the results of those tests and of the conclusions of the examiner?

Answer. No.

Question 5. Why is the individual undergoing the polygraph test told, *only if he inquires*, whether or not the examination is being monitored or recorded?

Answer. The polygraph interview situation itself serves as a disturbing stimulus to many people and the additional apprehension which may accompany the knowledge that they are being recorded or monitored is counter productive to the efforts of the polygraph examiner to put the individual at ease. For this reason only, the information is not volunteered by the polygraph examiner to each individual. The individual is told truthfully whether or not the interview is being monitored or recorded whenever the question is asked.

Following discussions with the Subcommittee on this issue, the Agency has initiated a procedure whereby each applicant will be informed in writing prior to polygraph interview that the polygraph test may be monitored and recorded for purposes of accuracy. We plan on including a statement to this effect in the polygraph agreement which is provided to each applicant before the test. A copy of the modified polygraph agreement is attached. This proposal has now been presented to our Office of General Counsel for coordination.

Question 6. In fiscal year 1974 has information from or the results of CIA-administered polygraph tests been made known to other Federal agencies or offices in the Executive Branch? Under what circumstances?

Answer. CIA releases information derived from polygraph tests only on request of federal employers. In fiscal year 1974, CIA disseminated information resulting from CIA polygraph tests in 7 cases. In each case, the individual involved was employed or assigned in a civilian or military capacity to a federal department or agency involved in sensitive intelligence affairs or requiring sensitive information in the national interest. Authorization to release this information was obtained in each case from the Deputy Director of Central Intelligence. Subsequent to the authorization, information was passed verbally through established security channels for investigative lead processing only. The receiving department or agency was then to conduct its own independent investigation to substantiate the lead provided by CIA.

Question 7. Is it a requirement, prior to an individual being given a polygraph test, that he be *examined* by a physician and by a psychiatrist or psychologist? Are such examinations more than an interview?

Answer. This question must be answered in two parts.

(A) The procedure followed by CIA in processing an applicant for employment has been structured so that physical examinations and psychiatric screenings are performed prior to the polygraph interview.

(B) The examinations are more than interviews. The examinations are good physical examinations which assist in the determination whether or not the applicant is physically fit for that category of duty for which he is contemplated. Applicants are also psychiatrically screened. Where a mental problem is indicated, a full-fledged evaluation is made.

Question 8. Would you recommend such prerequisite examinations be adopted Government-wide, by all agencies administering polygraph tests?

Answer. Although the CIA orders its processing so that all candidates for employment are first given medical examinations and screened psychiatrically and believes this is a sound procedure, the CIA refrains from commenting on procedures of other government agencies in administering polygraph tests and from recommending a course of action to be adopted government wide.

Question 9. To what extent are full and free discussions by CIA personnel with the President's Foreign Intelligence Advisory Board inhibited by the fact that neither the members of that board nor its Executive Secretary nor any of the Board's employees must take and pass a polygraph test as a condition of appointment or employment?

Answer. Full and free discussions by CIA personnel with the PFIAB are not in any way inhibited by the fact that associated personnel are not polygraphed as a condition of employment or appointment.

Question. 10. Why is it necessary for CIA to use polygraphs for pre-employment screening when the State and Defense Departments and the FBI do not believe it is necessary for their many sensitive jobs?

Answer. The CIA respectfully refrains from comment on the applicant processing procedures of the Department of State, the Defense Department and the Federal Bureau of Investigation. The CIA has found the use of the polygraph to be a positive assistance in employment screening and personnel investigation. The loss of the polygraph program would have a negative and undesirable effect on the continued secure operations of the Agency.

Question 11. The top two officials are not required to undergo polygraph testing yet all other CIA officials and employees are. What possible justification could there be for testing all the Indians but not the two biggest Chiefs?

Answer. There are only two positions in CIA filled by the President by and with the advice and consent of the Senate. These appointees are subject to whatever screening procedures may be prescribed by the President, or suggested by Congress and approved by the President. Therefore, it does not seem appropriate that CIA require additional screening procedures, such as the polygraph test, for these appointees.

Question 12. What are your views on the advantages that could accrue if responsibility for polygraph examiner training were to be assigned to one agency, consolidated at one or two locations, and standardized as to length, course consent, and examining techniques?

Answer. There are some advantages that could accrue if responsibility for polygraph examiner training were to be consolidated and standardized. Among these are:

Selection of best training personnel available.

Establishment of criteria for examiner qualifications.

A better overview of government's polygraph requirements and applications.

A potential for contact with commercial efforts on polygraph research, developments and application.

A pooling of experience.

A focal point for government sponsored polygraph research, development and application.

A possible financial advantage.

As to disadvantages:

A consolidated school would, of necessity, be limited to presenting a general curriculum of polygraph training not designed to accommodate special requirements unique to a specific government agency. As explained in our response to Question 3, a general curriculum divorced from our particular needs and separated from our on-the-job capabilities would be inefficient and time-wasting.

POLYGRAPH AGREEMENT

I, _____, an employee of the Central Intelligence Agency, understand that the Agency uses Polygraph testing as a routine procedure and that every employee of the Agency will be requested to participate in Polygraph tests from time to time. Having been informed of my rights under the Constitution, I agree, of my own free will and without any compulsion, duress, or promise of reward or immunity, to an interview with officials of the Central Intelligence Agency, during which I will participate in Polygraph tests, and I consent to the monitoring and recording of these tests for the purpose of accuracy.

I have read the foregoing and fully understand its import.

In witness whereof, I place my signature below, this ____ day of _____ 19_____.

_____

Signature

The above was read and signed in my presence this _____ day of _____ _____ 19_____.

_____
Signature

POYGRAPH AGREEMENT

I, _____, an applicant for employment with the Central Intelligence Agency, understand that the Agency uses Polygraph testing as a routine procedure and that every employee of the Agency will be requested to participate in Polygraph tests from time to time. Having been informed of my rights under the Constitution, I agree, of my own free will and without any compulsion, duress, or promise of reward or immunity, to an interview with officials of the Central Intelligence Agency, during which I will participate in Polygraph tests, and I consent to the monitoring and recording of these tests for the purpose of accuracy.

I have read the foregoing and fully understand its import.

In witness whereof, I place my signature below, this ____ day of _____ _____19____.

_____
Signature

The above was read and signed in my presence this _____ day of _____ _____19____.

_____
Signature

[Whereupon, at 12:20 p.m., the subcommittee adjourned, to reconvene, subject to the call of the Chair.]

APPENDIXES

Appendix 1.—Letter From Hope Eastman, Associate Director, American Civil Liberties Union, Regarding Hearings, Dated June 4, 1974

American Civil Liberties Union,
Washington, D.C. June 4, 1974.

Hon. William S. Moorhead,
Chairman, Foreign Operations and Government Information Subcommittee, Rayburn House Office Building, Washington, D.C.

Dear Congressman Moorhead: Thank you for your letter of May 28, inviting a representative of the American Civil Liberties Union to testify at your hearings on the use of polygraphs and similar devices.

We understand that you have also invited a representative of the ACLU Foundation's project on privacy and data collection to appear at the hearings. I believe that our testimony would be duplicative and that, therefore, it would really not be helpful to you to send a separate witness.

We appreciate being invited and wish you well in this very important work. As you know, the ACLU strongly believes that polygraphs and similar devices are inherently coercive and should not be used by the Federal Government. We are hopeful that your current hearings will lead the subcommittee to conclude that prohibitory legislation is in order.

We would appreciate this letter being made a part of the hearing record.

Sincerely,

Hope Eastman,
Associate Director.

Appendix 2.—Statement for the Record Submitted by Leonarde H. Harrelson, Director, Keeler Polygraph Institute, Chicago, Ill., Dated May 28, 1974

Leonarde Keeler, Inc.
Keeler Polygraph Institute,
Chicago, Ill., May 28, 1974.

William S. Moorhead,
Congress of the United States, House of Representatives, Rayburn House Office Building, Washington, D.C.

Dear Congressman Moorhead: In the opinion of the undersigned the polygraph, when operated by a trained, qualified polygraph examiner, is the most reliable means available in determining truth or deception. It is my opinion the results of a polygraph examination, when conducted by a qualified polygraph examiner, are as reliable as other disciplines that are admitted as evidence in our courts; namely, fingerprints, firearms identification, and handwriting, etc.

This office conducts polygraph examinations for private businesses, defense attorneys, and prosecuting attorneys on all levels: County, State, and Federal, courts, psychiatrists, police departments, high schools, universities, and churches. This office conducts preemployment-type examinations and specific-loss-type examinations, as well as criminal-type examinations.

Information developed during polygraph examinations of many applicants to police departments is frightening.

We also conduct a school for the training of qualified polygraph examiners.

Many innocent persons from time to time have no way other than the polygraph to prove their innocence. Frequently, the polygraph is the only way to prove the perpetrator of serious criminal offenses.

I do not have any personal knowledge of the psychological stress evaluator. As an experienced polygraph examiner, I have an opinion. It is against the law in the State of Illinois to use the PSE alone as an instrument to detect truth or deception.

The State of Illinois, along with several other States, has passed licensing laws to regulate and control polygraph examiners.

I will be happy to furnish any additional information you may require.

Respectfully,

Leonarde H. Harrelson,
Director.

APPENDIX 3

STATEMENT FOR THE RECORD SUBMITTED BY STEFAN T. POSSONY, HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE, STANFORD UNIVERSITY, PALO ALTO, CALIF.

Statement

to the

Foreign Operations and Government Information Subcommittee

of the

Committee on Government Operations

Psychodiagnostics and U.S. Security

On Untruths and Truths about Lie Detection

Stefan T. Possony

Hoover Institution on War, Revolution and Peace

It is best to start this statement with several disclaimers. I am not opposed, on principle, to the polygraph, and I do not regard the instrument as worthless. On the contrary, the polygraph represents a pioneering technological development and could contribute to achieving a better understanding of the interrelationships between psychological states and physiology.

I am not opposed, on principle, to the use of the polygraph in security investigations. I have no quarrel with the contention that

from time to time, the polygraph has helped to uncover information which but for the use of the instrument might have remained hidden. But it is imperative that the polygraph be used in a manner that is scientifically and legally appropriate.

I am not opposed to, or even particularly critical of, the system through which the United States government seeks to prevent infiltration by hostile agents and, more generally, to protect its internal security. American investigators and security agencies have a difficult and thankless job to perform, and their freedom of action has been unduly narrowed by legal and political constraints. They do need all the technical support they can get, and it is not surprising that they are infatuated with a gadget which promises easy answers.

I should add that the American internal security set-up differs most significantly from the despotic and inhumane police systems of

the totalitarian states. But it does not live up to the standards this nation has chosen to observe and represent.

* * *

It has been my life-long conviction that national security commands -- or should command -- the highest priority in the activities of the government. The continued manageability of totalitarian threats is at stake. For this very reason I am arguing that we should not tolerate that the polygraph is being used furtively in the backrooms. Do we want policemen to sell patent medicines when the judge is not looking? The Department of Defense needs no skeleton in its closet, and certainly no skeleton which every day is brought into the living room for worshipful exercise. The polygraph is one type of equipment which does not lend itself to ambivalent management.

It is surprising, and disturbing, that the government has never yet taken a firm stand against the "lie detection" hocuspocus. Like any

technology which we incorporate in airplanes, ships or tanks, or any medical technique which we allow our physicians to use, or any drug which is released to the drugstore, the polygraph must be approached on the basis of scientific objectivity, technical excellence, statistical validation, investigative probity, administrative integrity, and legal acceptability.

* * *

Congressional studies of 1965 and 1966 disclosed serious deficiencies and abuses in the use of polygraphs as "lie detectors". Yet only cautious recommendations were made on the practices which the government should have been correcting on its own initiative. Whether or not even those minimal recommendations by Congress were implemented and misuse of the polygraph is now being avoided, only a full-fledged

investigation can determine. However, the outside observer who reads the twelve Department of Defense directives published in House Report No. 2081, September 26, 1966, cannot fail to note that even within DoD the various user agencies evaluate the instrument in different ways.

In House Report No. 198, March 22, 1965, the Committee on Government Operations showed that the polygraph is not a "lie detector"; that the discovery of mendacity requires "a process of inference" and is not accomplished through the polygraph per se; that the effectiveness of the instrument is in large part dependent upon the examiner's ability to convince the suspect "that the lie detector is going to work and ... impossible to beat", that is, on a mendacious argument which, presumably, would be protected against lie detection; that certain types of individuals and persons in particular states of physical

and mental health are poor respondents on the polygraph; and that techniques are available through which an individual can be trained to "beat" the machine.

The Committee did not draw attention to the fact that a testee is able to respond in the expected fashion, i.e. betray himself physiologically upon lying, only if he remembers the incident about which he is queried, and remembers the facts accurately. If the memory of culpable deeds is repressed and replaced by self-serving recollections, without the testee being conscious of the alteration, he will tend to respond innocently. However, self-incriminating lapses of memory also are conceivable. Confusion may occur as soon as the respondent becomes aware of the gaps in his memory; and his memory may be "helped" by intentional or unintentional hypnotic suggestions. The memory complication suggests that polygraph examinations about remote experiences

can be useful only in rare cases. Presumably, unreliability is also proportionate to the "incidentalness" of the experience which is investigated.

I have been told, on good authority, that neuroleptica offer a good chance of "beating the machine". They could be used, as a wag suggested, as a polygraph "deodorant".

The Committee failed to comment on the hilarious section VIII, para E, in DoD directive No. 5210.48, July 13, 1965. Albeit by implication, this text entrusts polygraph examiners with the task of determining whether prospective testees are in "sound physical or mental condition". (The sloppiness of this directive can be gleened from the confusion between "or" and "and".) The directive does not indicate what tests are to be used to make this determination. For example, are examiners qualified -- and authorized -- to establish whether a testee ingested drugs prior to the polygraph

examination? Are they accredited psychologists or psychiatrists? Since they obviously are not so qualified, and since no relevant medical examinations precede the interrogation,* the implication is that the naive subject may get "caught", while non-naive subjects -- like trained agents -- may be quite safe. This does not mean, of course, that the polygraph technique as practiced by the Department of Defense actually facilitates agent infiltration, but it does mean that the instrument and its utilization are not what they are cracked up to be.

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* Of course, medical examiners don't guarantee scientific objectivity either. In 1942, 9.7% of the draftees were rejected for mental illness. By 1945, the mental rejection rate had risen to 16.4%. In 1942, 28.8% of the rejections were for neuropsychiatric disability, in 1944 the rate was up to 45.8%. Those fluctuations hardly correspond to a sudden dramatic increase in the incidence of mental illness but presumably are derived from changed instructions or from altered perceptions by the examiners; or from diagnostic incompetence.

The Committee proposed that the use of the polygraph be prohibited "in all but the most serious national security and criminal cases".

This recommendation is responsive to the fact that mass use of the polygraph would compound the errors of "lie detection", but it is otherwise inconsistent with the Committee's findings. If the polygraph does have the deficiencies identified by Congressional inquiry; if the detection of truth is dependent upon "inferences" made by investigators or their superiors; and if the reliability of the instrument has not been determined quantitatively, the use of polygraphs in the attempted solution of the most serious cases would obviously entail far higher risks than if the polygraph were applied only to the least serious cases. Since the Committee did not think that minor cases should be investigated by means of the polygraph, perhaps the machine should not be used at all?

Surely, before any serious recommendation is made either for or against use, data should be released showing how many spies and infiltrators were caught by the polygraph? How many paranoiacs and maniacs were kept from the nuclear trigger? How many of those being subjected to blackmail were exposed? How many of those who leak classified information to the media were discovered? And, also, how often did the polygraph fail to prevent penetration by enemy agents?

Alas, such data will not be forthcoming, because they do not exist or, at any rate, they do not exist in a form suitable for statistical analysis. In its Report of March 22, 1965, the Committee pointed out that -- by 1965 -- some 200,000 polygraph examinations had been conducted by federal examiners. "Yet there has been no attempt to determine the validity of the procedure and no attempt to find out whether the polygraph operator really can detect falsehood. No statistical proof

has been compiled despite thousands of cases; no scientific proof has been produced despite thousands of opportunities." This finding is rather on the scandalous side,* and it should have provoked action. Yet it is not publically known whether, for example, the recommendations by the Institute for Defense Analysis on methods for determining the validity of polygraph examinations were implemented.

Pending the production and release of statistical data, it would be reasonable to assume that responsiveness to polygraph examinations is normally distributed within the population, i.e. about 16% would respond very accurately, 16% very inaccurately or negatively, and 68% would perform with moderate success. It should be recalled that early and entirely unsubstantiated claims that the polygraph performs accurately in 90% of the cases have been silently dropped.

The normal distribution would reflect the variances of individuals

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* The importance of this failure to test and verify will be discussed below in more detail.

in terms of psychological-physiological correlates. There are indications that the overall population could be divided into several types of those who are more or less responsive to polygraph measurements; and several separate and overlapping typologies may exist. The typologies may be found with respect to extraversion and introversion, psychoticism and neuroticism, memory capacity, attitudes to mendacity, etc.

Results would be best in the testing of responsive types, and worst if the sample of testees included only poor respondents.

Presumably, situations -- of the incriminated events as well as of the examinations -- also may be classified according to their impact on polygraph results.

It is not implied that responsiveness to the polygraph is necessarily normally distributed. But so long as the real distribution has not been uncovered, normal distribution must be assumed.

* * *

The theory underlying the polygraph may be simplified as follows: To a question Q an answer A is given which produces a registration R on the polygraph. R indicates whether A is truthful or untruthful.

That this sequence may occur is undisputed. However, it is evident that a successful sequence requires, first, a properly phrased question; second, an answer properly conceived in terms of truth and untruth; and third, assuming the machine functions properly, an accurate interpretation of the recordings. If Q, A, and R occur each in their proper fashion 97 out of 100 times, which assumes near infallibility, the overall accuracy of the procedure would be 91%; i.e. the truthfulness of 1 out of 10 testees would be wrongly assessed. If each of the three functions works properly only 9 out of 10 times, which still would be an exellent performance, total accuracy would be 73%; i.e. 27 out of 100 testees would be wrongly evaluated.

It cannot by any means be assumed that questions will be nearly always properly formulated. Such an assumption would be particularly unlikely if an entire series of questions were asked, without the interrogator having a deep knowledge of the testee and his alleged case. The difficulties of formulating questions so as to avoid false responses are well known to all opinion pollsters.

But this is merely a "technical" problem. The really basic difficulty lies in the following three assumptions: (a) questions and corresponding answers can always be conceived as simple truth-untruth dichotomies; (b) all respondents react to their lies according to a clearly identifiable, regular and repetitive pattern;* and (c) the

* If the pattern were repetitive, an investigation, to yield legally valid results, could involve three identical polygraph tests given by three different examiners. Do the polygraphers suggest such an approach which would be fully in line with their theory? If there are studies on repetitiveness, these should be presented to the subcommittee.

physiological reaction pattern usually associated with lying and which is registered on the polygraph is never produced by a psychological event other than mendacity.

As to (a). Many questions and answers fall outside the black-white dichotomy. The factors of memory and repression were discussed. Few questions and answers can be isolated within a complex issue and within the person's mind, instead, most are associated with extraneous matters. The emotional impact of one or the other association may be stronger than the specific emotion which is tied to the truth-untruth pair.* We may skip other types of possible complications.

As to (b). The inveterate liar hardly reacts like a person who values truthfulness highly. A polygraph-witting testee must react differently from a naive person. One and the same person may react differently at various times to the same question or type of question.

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* It may be observed that the assumption of a simple and single truth-untruth dichotomy reflects two-valued Aristotelian logic. But the Aristotelian model represents only one possibility of logical thinking. There are multi-valued logical systems.

Since attitudes to truth probably differ within each individual depending on the topic he is queried about, polygraph readings must vary in clarity. The search for the proper "indicators" is remniscent of the search for witch's marks on the bodies of persons accused of witchcraft. Here again we may dispense with further discussion.

As to (c). The assumption of a one-to-one relationship between lie and physiological event is extremely dubious. Aside from the fact that truth and untruth may be purely mental states not related to acts and deeds, the notion that man is a machine or an automaton was suggested during the 18th century by La Mettrie. During the 20th century it was revitalized by Jacques Loeb and heavily worked upon by the reflexologists and behaviorists. There is no scientific proof for this belief which, at the very least, forgets "the ghost in the machine" and which, in view of the complexity, ambiguity and ambivalence of psychic

phenomena is extremely unlikely to be correct. Even if it were correct with respect to truth-untruth, the intensities of the reactions would be variable, thus rendering accurate interpretations of polygraph readings difficult.

The man-equals-machine assumption is grounded in philosophy, not in scientific fact. Although this particular "materialist" philosophy is not the one which is reflected in the constitutional documents of the United States, it has now become something like a dogma. And like dogmas of other civilizations and times, it begins to ask for its due of human sacrifice.

The issue need not be prejudged since mendacity may have a very specific "signature" which distinguishes it from all other psychic excitements. But such a signature is yet to be identified, including its quantitative parameters. In addition, the possibility that several distribution patterns exist with respect to the veracity of human types is yet to be excluded by statistical-experimental evidence.

True, research may indicate ways by which the handling of the Q, A, and R factors can be improved. Presumably such improvements, if

feasible at all, would complicate polygraph procedures; would require highly trained operators, i.e. an elite group which may never be available in numbers required for mass use; and may in practice yield far more ambiguous results than could be attainable under ideal laboratory conditions.

If accuracy of performance on Q, A, and R were ensured in two out of three cases, or questions, reliability of the polygraph procedure would be about 29%. If accuracy could be boosted to four out of five cases, or questions, reliability would be 51%, or slightly better than chance.

* * *

In assuming that a mendacious statement is accompanied or followed by physiological indicators, a reflex relationship is postulated.* Like in the classical experiments by Pavlov, the lie functions like the sound

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* To explain how a stimulus S may produce various responses, behaviorists have been talking about "hypothetical mechanisms" or "intervening variables" which may become active in a person's head. Those variables which the polygraphist would have to understand before he could practice his craft in an objective manner, remain entirely unknown. (Consult Arthur Koestler, The Ghost in the Machine, New York, MacMillan, 1967, ch. I and p. 351).

of the bell and the polygraph-registered physiological events parallel the salivating by the dogs.

Obviously, the reflexes revealing deception are conditioned and not unconditioned reflexes. The recognition of truth and untruth involves learning, and the association of untruth with physiological stress reactions results from conditioning.

Laughter, too, is a conditioned reflex: a great deal of learning is required to recognize the humor of a situation or a joke, but once there is such recognition (which acts like Pavlov's bell), the familiar physiological-muscular phenomenon of laughter occurs. The complexity of this particular reflex action is appreciated by all of us. We know that some persons lack humor, whereas others revel in it. The gradations in response range from incomprehension via a "stone face" to prolonged physiological responses like "gales of laughter" and tears.

Misunderstandings and extraneous associations occur in most humorous situations, and not everybody's funny bone is tickled in the same way even by a joke which all are enjoying.

The laughter reflex tends to be far more ostentatious than the truth reflex but it usually can be controlled without too much difficulty: professional men like orators, actors, lawyers, and physicians must learn to control it effectively lest they laugh themselves out of a job.

The polygraph is dependent upon the extent to which the testee is conditioned to reject untruth. Even assuming adequate conditioning, the testee should be able to weaken or distort the reflex action by activating, in his own mind, imagery that is related to other conditioned reflexes including sex, humor, and rage, and recollections of joyful and traumatic experiences. Such mental defenses can be learned, albeit

with various degrees of success, and together with habituation, knowledge of the technical characteristics of the machine, and perhaps mechanical trickery, may affect polygraph readings. To what extent a conditioned reflex may be unlearned may be left as an open question. But that, at least in some individuals, conditioned reflexes may be modified, i.e. weakened as well as strengthened, can be observed every day. Drill, indoctrination, discipline, education, symbolic propaganda, etc., are activities designed to achieve such modifications.

The basic conditioning of a strongly motivated communist true red believer must necessarily differ from that of a normal red-white-blue American. Furthermore, a properly trained agent might have been reconditioned and trained to handle polygraph interrogations. So long as this entire complex remains unresearched, we better beware of

regarding the polygraph as a device which can be depended upon to prevent communist penetration.

* * *

In the U.S. "lie detection" is not in the hands of a totalitarian inquisition or police, the polygraph is not an instrument of torture inflicting physical pain, and the suspected or proven liar is not burned at the stake. Yet the question arises whether the U.S. should tolerate inquisitorial practices even in mild forms and even if those masquerade as application of science. According to Henry Charles Lea, the typical inquisitor tried to ascertain the "thoughts and opinions" of the accused, he tailored his evidence, he enjoyed almost limitless authority, and he lacked supervision and responsibility. This is not at all dissimilar from the status of the polygraph community, except that the polygraphist cannot

pronounce criminal judgment. But, in point of fact, he can ruin a person's career and livelihood, and he may directly or indirectly influence strategic decisions.

Any polygraph examination is necessarily an invasion of privacy and constitutes pressure for self-incrimination, granted that it also may help an accused to exculpate himself. Thus, it violates the Fifth Amendment. The lie detection program also involves violations of the Sixth, Eighth, and Fourteenth Amendments.

I do not quarrel with occasional constitutional transgressions if those are necessary to protect the United States. But an institutionalized daily procedure which violates the Bill of Rights -- in itself the Bill of Rights is a vital element of America -- is an entirely different matter. The Bill of Rights is supposed to regulate the daily lives of Americans. It is, therefore, incumbent upon the government to observe

this Bill in its security operations, including "lie detection". I can see no reason why it should not be feasible at the same time to protect U.S. security and the rights of suspects (and applicants). The cavalier treatment of the U.S. Constitution by responsible officials does suggest that in swearing their oath to uphold the Constitution they may not have been entirely truthful.

In any event, the substitution in security investigations of legal for inquisitorial procedures may help lie detection rather than harm it.

* * *

DoD directive No. 5210.48, section IV, paragraph C states: "Adverse action shall not be taken against a person for refusal to take a polygraph examination or for unwillingness to volunteer to take a

a polygraph examination. Moreover, information concerning a person's refusal ... shall not be recorded in his personnel file ... The continuation of an investigation is, however, ... not prohibited by the section."

If this double-talk is translated into plain English, it seems that such refusals are recorded in security files, and that they stay there forever. This means that refusals do influence clearance recommendations by investigative agencies. On this subject, too, it would be useful to have statistics showing how many of those who were asked to take a polygraph test but declined, were later hurt in their careers.

Congress should know whether the security files include explanations by refusing individuals about their reasons, so that it can be determined whether they were protecting themselves against abuse, or whether

they refused to cover their tracks.

According to the DoD directive, section V, paragraph B, 3, "no adverse action will be taken ... because of a refusal to consent to a polygraph examination".. The question is: given a refusal, will the person be transferred and henceforth be kept out from sensitive jobs? What happens to the status of his clearances after refusal?

It is not contended that after refusal to take a polygraph test adverse actions are necessarily wrong. The chances are at least even that they are justified. But if such actions were justified, why should they be ruled out? It is impossible to take this stipulation seriously. It does not describe reality, instead it displays lack of candor. Furthermore, the following important questions remain unanswered: Is no negative action supposed to be taken because the

polygraph is not regarded as a dependable instrument of lie detection? But why, if the polygraph were considered to be reliable, must a refusal not be viewed as a serious matter? If, therefore, negative actions are taken in the real world -- although they may be justified on grounds unrelated to the refusal -- what is the procedure through which a wrongly affected person can be fully re-instated?

* * *

Let us look at this marvelous principle of voluntarism more closely. Suppose the polygraph were taken seriously as a thoroughly dependable instrument. In this case, why should its use not be made compulsory and be extended to cover security problems of all types? It may be argued that such a provision would be unconstitutional, in which case, of course, tests through which applicants are screened

for employment would be unconstitutional, too. But perhaps, if the polygraph were truly reliable, there would be no constitutional barrier. Evidence on truthfulness must not be construed as "self-incrimination"; it can be the very opposite. The risk of self-incrimination could be avoided if the polygraph were used as a tool of intelligence collection only and were divorced from criminal prosecution and other forms of punishment.

A person who volunteers for military service, agrees to obey orders. Certain orders, which are unavoidable, may entail his mutilation or death and, therefore, may "violate" his most basic human right. Yet the soldier is not allowed to refuse obedience, on the grounds that he must protect his innate right to self-preservation. If the right to life can be suspended in the name of military necessity, a forteriori the government's right to issue orders for battle includes

the lesser right of asking security personnel to undergo polygraph examinations.

Further on voluntarism. Suppose DoD personnel stationed in a remote area or in a biological research laboratory, were hit by an epidemic disease. Obviously, the affected persons would be kept in quarantine; and in case there is an effective vaccine, all persons at risk would be vaccinated. Objections to vaccination would be overruled.

Similarly, if at the end of their voyage, astronauts returning from space were to refuse medical examination and quarantine, the government would enforce compliance.

The U.S. government never hesitates -- nor does any government -- to impose compulsory health measures whenever this seems necessary. But it never imposes measures unless those have been properly tested

through the required statistical methodology, have been proved to be protective, and entail minimal or no side-effects; unless no better alternatives are available; unless effectiveness does not depend upon variances in human typology, i.e. in mass treatment all those who are treated must be protected; and unless overall effectiveness of the undertaking approximates nearly zero loss and nearly 100% success.

Matters of national security, which include risks of nuclear war, are more important than matters of public health and affect the most basic rights of millions of people. There are no short cuts. If the scientific tool to be used has not been fully proved, it is merely an experimental device. If the utility of the tool is merely that of an auxiliary tool to help a practitioner, just like a swinging watch helps the hypnotist, then that practitioner is the key element of the technique, and not the device. And if the interrogator is the key,

we are dealing with the art of interrogation, not with interrogation as a science.

* * *

To illustrate the nature of the problem, let us look at a few scenarios.

1. "The operator of the polygraph is the most important component of the 'lie detection' technique." (House Report No. 198.) Since this is so, the danger exists that the operator does not present an honest interpretation, regardless of whether he is himself unsure of the data and his interpretation, or does not like the testee, or has been ordered to "get" the suspect, etc. Why, then, is it not part of the routine to have the operators present their findings on and from a polygraph? Why are those persons who order a polygraph test

not being examined on the instrument in order to determine whether they are acting from proper motives and do sincerely believe, on the basis of an adequate foundation in knowledge, that a polygraph examination is really necessary? It might be objected that a person who undergoes polygraph tests frequently will experience "flat" reactions and that, therefore, repeated testing is inadvisable. But wouldn't this be an interesting answer?

2. Security is heavily dependent upon the veracity and honesty of the intelligence briefings given to the President and on truthful testimony presented by defense secretaries and military chiefs to Congress. Why, if the polygraph were a fully reliable instrument, would intelligence briefings and testimonies not be validated? After all, there have been cases of misleading and perhaps dishonest presentations. Might the use of the polygraph not contribute to honest budget proposals, i.e. to proposals which the service chiefs

really believe are necessary for the good of the country and not just helpful for "empire building"? By the same token, Congressional questioners and tormentors of the military could make their charges while sitting on polygraph benches. If the polygraph were O.K., the country would benefit. But if the polygraph does not live up to its promise, the country would suffer.

3. In past wars, deserters, defectors and prisoners often provided information and warnings about impending attack. Sometimes those warnings were acted upon with positive and sometimes with negative consequences. Often the warnings were ignored, and such disregard either turned out to have been a proper decision or it resulted in disaster. Not infrequently the soldiers who came over from the other side of the battlefield were agents who had been thoroughly trained in deception tactics.

Undoubtedly, in future wars such situations will repeat themselves; and we can be certain that current and future agent training does and will include instruction on how to beat the polygraph.

Suppose a defector shows up with the information that an attack will be launched within six hours in direction of place P. This information could be false with respect to the assertion that there will be an attack, and it could be false with respect to the timing and the P direction of the assault. The defector could be lying by exaggerating or distorting his knowledge or by inventing the story; or in performing as an agent, he could be lying with strategic purpose. It also is possible that subjectively he is speaking the truth but objectively he is purveying false information which was conveyed to him without his being aware of the trick. He may be speaking the truth but the interrogators don't believe him because his information contradicts their pre-judgments.

Finally, he may be speaking the truth and he may be believed.

Whatever the details, if a defector shows up with important time-value information requiring fast action, there is an overwhelming need to test his truthfulness and state of mind. Since there is no time to lose, a speedy psycho-diagnostic procedure must be applied. The polygraph offers a chance of verification. Hence it would be foolish not to use this instrument. Naturally, the information would also be checked against intelligence, but I will skip consideration of this problem.

If the defector were examined with the help of the polygraph, the chance of obtaining a reliable finding would depend upon the proficiency of the polygraph operator, the interpreters of the graphs, and the interrogators; quite aside from the responsiveness of the defector and the clarity of the recordings. In such a critical

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situation, several experts would be called in to help in the interrogation. Still, even assuming optimal conditions in the interrogation room, there is not much time to illuminate the man's background; tests of his memory must remain perfunctory; it will be difficult to identify the individual's type as a polygraph respondent; the person who just experienced the excitement of defection may not be in a state that is optimal for examination; and the key question of whether the individual was trained to "beat" the "lie detector" may be left unanswered.

Under the circumstances honest examiners will not announce firm judgments but restrict themselves to probabilistic opinions, e.g. "there is an 80% probability the defector is speaking the truth".

The commanding officer must evaluate such probabilistic findings.

What is the operational meaning of the determination that there is a 20% probability the defector is lying? Should the commander act or not act upon the warning? And how should he act?

If the general knows nothing about polygraph problems, he may insist on a dogmatic judgment: the man is (or is not) telling the truth. Once he gets such advice, the commander would be in the hands of low-ranking diagnosticians who, whether they themselves be truthful or untruthful, proficient or amateurish, are no strategists. Yet they would be making a crucial military decision. The commander, of course, should rely on his own judgment. Yet if the general was previously oversold on the reliability of the lie detection technique, he would find it easy to accept the diagnostician's advice. Even if he knows the results of polygraph tests must be evaluated, he may still assume that polygraph interrogations performed by experienced

professionals in most instances will be more dependable than an interrogation across-the-table relying on intuitive interpretations of verbal communications and facial expressions. This assumption may be reasonable but it still would reflect confidence in the polygraph which, as a generalized judgment, lacks scientific justification. Under certain circumstances it might be better to interrogate the defector through conventional techniques rather than pre-empt on the polygraph the short time that is available for decision-making.

* * *

There are two implications in this scenario:

1. A commanding officer who for years routinely cleared, transferred, rejected, and court-martialed personnel on the basis of polygraph investigations will tend to believe that he can rely

on the instrument. In fact, I have heard officers express the opinion that the polygraph is "infallible". Such a belief is dangerous and will condition the officer to act upon polygraph findings naively, especially at a crucial moment when, very suddenly, the security of his entire force is at stake.

Naturally, if the general were aware of the pitfalls of polygraph examinations, his decision would necessarily be different. Obviously, officers must be briefed about the strong and weak points of the instrument. Yet the difficulty of transposing probabilistic findings into operational decisions, and of resisting the temptation to act positively on the higher probability remains. I describe this inclination, which would be reasonable in everyday life, as a "temptation", because in war surprise rules supreme. Surprise is simply a condition where the "improbable" factors are made to become real.

Thus, the witting commander may want to treat an 8:2 diagnosis as a 5:5 chance. On the hypothesis of chance, two alternatives must be investigated simultaneously; (a) that the defector is wittingly or unwittingly an agent, hence the job is to identify the deception the enemy is planning; * (b) that the defector is honest, hence the job is to review the intelligence again and take the warning seriously. Within such a probabilistic framework, the polygraph may help to sharpen both analyses.

2. The scenario shows that a reliable psycho-diagnostic capability may be just as important as a major weapon system. Accordingly, effective psycho-diagnostics are needed. But the singling out of the polygraph, which is merely one element in a large set of conceivable psycho-diagnostic instruments, and which stands in relation to a mature capability like the hulbert stands to Minuteman III, would be mistaken.

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* The enemy could use double deception stratagems which, for example, could plan for the discovery of mendacity: the defector's information would be rejected if the polygraph indicated lying, hence a particular anticipation of enemy action would be rejected, too. But the enemy would carry out the very action about which, on polygraph evidence, it was anticipated that it would not occur.

Psycho-diagnostics include, inter alia, elementary practices like offers of reward, plea bargaining and promises of punishment; psychological techniques such as analysis, specially designed tests, confession, suggestion, persuasion, conditioning, and hypnosis; analysis of the full set of stress indicators; terrorization; psychopharmaca; narco-analysis; electroshock; brainwave analysis and feedback mechanism; as well as computer enhancement and computerized analysis.*

Psycho-diagnostics could be perfected through this type of approach. The polygraph itself is deemed effective because it uses several sensors. Once better insights exist, the defector could be queried by far more numerous techniques and in due time -- who knows? -- something like a real-time result might be achieved. There also might be progress leading away from the concept of "lie detection" to that of "truth induction". Before such capabilities arise, if they ever do, a huge amount of research and experimentation is yet to be performed. The very fundamental difficulty may remain insuperable that the human brain is not a machine and that even if it could be compared to a computer, the complexity of the brain exceeds that of the most advanced man-made computation devices.

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* The effectiveness of computers would depend on the pertinence of the "soft-ware" which is used.

In my judgment, the polygraph has been oversold as an instrument of personnel selection and counter-espionage, as well as an instrument of intelligence collection. It also has been oversold as the key to psycho-diagnostics. At the same time, psycho-diagnostics have been undersold in terms of R&D requirements and strategic potentialities.

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A word should be said about the mass use of the polygraph, for example, to prevent "leaking". I have no quarrel whatever with the purpose, but the polygraph is not the instrument to accomplish it. The testing of several hundred of thousands of persons within a short time would be "logistically" impossible. To the extent that large numbers of examiners were drawn into the work, the quality of the operation would be decreased because the average performance of the operation would decline.

In such an undertaking the use of the polygraph would be expanded from detecting lies to testing "trustworthiness", i.e. from discovering a deed actually perpetrated in the past to establishing a presumption that the testee in future will not commit certain undesirable actions. It should be self-evident that the use of the polygraph operators as prophets would require the re-writing of their job descriptions and that the requisite job descriptions which must declare that incumbent "will perform" such and those tasks, would be totally mendacious.

Pending the switch into prophecy, we might think for a moment about how the polygraph could be used for predictions. Obviously, in order to determine truthworthiness, the testee's psychological weaknesses would have to be found out. But who has no psychological weaknesses? Who never told a lie? Who was never indiscreet? Who never gets mad

or anxious? Let us drop the subject by recalling that in 1568 the Spanish Inquisition declared the entire population of the Netherlands to be heretic and condemned it to death, while in 1609 the entire population of Protestant Navarre was declared to consist of witches. Perhaps those times have passed. But we better make sure they do not return.

* * *

If we compare the polygraph with a medical specialty, we can say that the polygraph is a quasi-medical specialty which was taken over by the nurses. The doctors are not admitted to practice in this field, the scientific back-up is woefully inadequate, and the current expectations on performance are too high. If the general philosophy which the U.S. government is applying to public health were adhered to with respect to the polygraph, this machine would be restricted to

specialists with high rather than low qualifications.*

To find methods permitting the effective diagnosis of psychological and mental states has been one of the most challenging tasks throughout history. This task, which was not solved even by torture and which remains unsolved, is continuing but it cannot possibly be entrusted to individuals with perfunctory preparation. In the United States, to pull a tooth, one must have a dental degree. To handle a mild neurosis, one needs a degree in clinical psychology. To perform surgical operations, one must be a highly qualified and certified surgeon. Of course, medical doctors cannot function without nurses and nurses aides.

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* Furthermore, the utilization of polygraphs in private industry would be forbidden.

Similarly, in the polygraph field, some tasks can be performed by the "operators". But it is entirely inappropriate to use such operators as diagnosticians and to allow them to work without professional supervision.

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The effectiveness of a military force depends upon its physical strength but, if we are to believe Napoleon, moral strength is three times more important. Within this context, there is a dimension of the polygraph problem which is rarely mentioned but which requires considerable study and political care. To what extent does the polygraph and its employment in relation to bureaucratic infighting -- which is rarely conducted with the utmost respect for truth -- impair the esprit de corps within the military services? To what extent does the polygraph provide higher ranking personnel with undue power over their subordinates? To what extent does the

machine contribute to the rigidity of administration and decision-making? How does all this affect selection to higher rank?

To put this differently: what usage of the polygraph is organizationally harmful in a military society, and what other usage is, or could be, helpful to military efficiency? How does the polygraph practice jibe with the time-proven concepts that armies are built upon mutual trust and loyalty and that only gentlemen can be good officers and leaders of men? Do the polygraphists and investigators not wield too much inquisitional power? And does such power not weaken the cohesion of the military community?

Stories have beeen heard about persons "being strapped to the box" because of actions which, supposedly, were "unbecoming an officer". In such cases, notably when they deal with sex, the rules of gentlemanly

behavior tend to be interpreted according to the canons of sainthood. In other instances officers were "strapped to the box" because they opposed the policies of civilian superiors, and because, in their minds, they acted as honest servants of the American people. Polygraph ploys were used to pick scapegoats for "leaks" perpetrated by top ranking personnel who needed to blame someone else. Investigations are not necessarily conducted according to the principle that those who claim that through the polygraph they are upholding truth, must conduct themselves with the utmost truthfulness toward those they are investigating. The mental conditioning before examinations concerning the effectiveness of the polygraph may be necessary for good results but, though it is an institutional procedure, it is not an exercise in truthfulness.

It would be unfair to criticize investigative organizations for their enthusiasm about the polygraph. Investigators are given orders, they are issued the equipment, they are trained and indoctrinated to follow procedures, and they are expected to get reliable results within low-cost budgets. Their access to R&D is strictly limited. Still, the investigating community cannot dispute the reproach that it has failed to object to the use of an unsound (or unfinished) technology and that many of its members have made exaggerated claims to higher authority. They should have been first and foremost among the warners against abuse by polygraph.

But even if professional ethics were at their peak, the standards that are observed in practice must be supervised to ensure that rights are being respected and the rules of evidence observed. If an operation

of this kind is left to control itself, it will soon go beyond the limits to which it must properly be held.

Accordingly, the abuses and deficiencies of polygraph programs, such as they are, must be ascribed primarily to those in higher authority, including the long gray and bipartisan line of civilian secretaries who have failed to exercise the requisite administrative wisdom. If the Department of Defense is to acquire psycho-diagnostic capabilities which would neither undermine morale, nor impair the rights of the personnel upon whose good will and enthusiasm American security is utterly dependent, new approaches are mandatory.

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It is evident that the "competent organs", to use a soviet expression, view criticism of the polygraph with disfavor. Many

polygraph technicians are inclined to regard skepticism about their craft as something akin to subversion and, hence, see no reason to change basic policy. Experience has shown that criticism lacks punch and endurance. So why take it seriously?

Do they even understand the criticism? They probably understand quite well. Do they have information which invalidates the objections that have been raised against the polygraph? Undoubtedly, they possess much information which has not been released and which may be used to "prove" the reliability of the polygraph on a classified level. But if there were a genuine validation of the machine, the chances are that pertinent information would have been published. For that matter, the chances are that outside scientists would have produced the evidence and that correlated studies would have been undertaken for purposes of corroboration. Possibly I just missed all this effort,

but so did a lot of other people.

In my judgment, which I leave open for correction, the reason for the continuing rigidity is not that the "competent organs" are unaware of the criticism or possess secret and superior knowledge. They don't want to lose the advantages they think they are getting from the polygraph and which, in fact, they may be obtaining by using the machine as a prop or trick. Interrogation is an art, and no one should begrudge the artist if he practices flim-flam. If he is to succeed, the interrogator needs a stage and must use incantations and magic. One key trick has always been to describe "art" as "science".

It is probably also true that the polygraphers don't want to pull in their horns and feel obligated to defend their vested organizational interests. Nevertheless, autistic thinking is often the key root of troublesome unbending rigidity. It also is a typical

characteristic of groups which handle specialities, which are geared to "faith" rather than knowlege, and which operate in a closed circle with limited outside contacts. For example, a psychiatrist with more than twenty years of experience never knew "a clinical psychologist to report, on the basis of a projective test", like the Rohrschach or Thematic Apperception Test, "that the subject is a 'normal, mentally healthy person'." Negative findings were submitted on the assumption that if a testee visits a psychiatrist, something must be wrong with him.

The very fact that, so far, American polygraphists have a worse record for candor than the persecutors of witches strongly suggests the impact of autism.

To some extent, autistic thinking is necessary to make individuals and groups stick to their chores; but even a small over-dose can be

dangerous. Furthermore, autistic thinking tends to feed upon itself. If problems no longer are viewed in their broad context, alternate frames of reference are disregarded and condemned, and solutions are approached only within narrow parameters. Organizations which fall victim to autistic thinking see themselves compelled to conceal, to confuse, and to dissemble, and they tend to become obsessional. Trouble is brewing whenever thinking becomes dysfunctional. This is particularly true of inquisitional agencies which are professionally prone to move into autistic thought patterns.

The nature of autistic thinking may be illustrated through the persecution of "witches". In medieval Latin, a witch is a malefica, i.e. a woman who does evil.* What evil? The crimes of witchcraft were promptly

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* Another term was venefica or female poisoner (or provider of drugs). This meaning is, of course, more specific: whether or not a person is a poisoner is subject to proof or disproof. Allegations on "malefaction" are impossible to handle by legal rules.

invented (and the delicta were applied retroactively, just as U.S. investigators in the early 1950's sometimes wondered whether a person had not been a "pre-mature anti-nazi" -- meaning if he opposed the nazis as early as 1933 or 1935, he probably was a communist). The autistic thinker does not shrink from making cases of whole cloth. In addition, the person who allegedly committed the artificially invented crime cannot be allowed to escape. In his Cautio Criminalis, Friedrich von Spee, S.J., wrote in 1631 that it does not matter whether the accused witch confesses or not: "If she confesses, her guilt is clear: she is executed ... If she does not confess, the torture is repeated .... She can never clear herself. The investigative body would feel disgraced if it acquitted a woman" who ever was accused of witchcraft. (Italics added).

It is part of the "no escape" aspect of autistic thinking that

the person gripped by this disorder cannot escape lying. He rationalizes his mendacity by "mental reservations" the nature of which may be gleened from the notorious Malleus Maleficarum (1486): In difficult cases, the judge should promise the recalcitrant witch "that he will be merciful, with the mental reservation that he means he will be merciful to himself or the state; for whatever is done for the safety of the state is merciful."

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Autistic thinking was first described in 1912 by Eugen Bleuler; and a relevant article by him was published in an American psychiatric journal as early as 1913. Gardner Murphy dealt with the topic extensively in 1947. Thus, the phenomenon has been known for a long time. It

also has been frequently misunderstood and confused with seemingly similar and related phenomena, such as autism or withdrawal. Autistic thinking is not withdrawn but outgoing mentation, often to the point of aggressiveness.

Autistic thinking appertains to each autos or self, whether individuals or communal, societal or organizational entities are involved. It organizes percepts, ideas, motivations, and behavior to satisfy perceived needs, including attachments to symbols, and the needs or goals a person assumes are those of a community or organization to which he belongs. Autocentristic tendencies are required for self-direction, persistence, goal orientation, and social cohesion, etc. Accordingly, the borderlines between normal self-determined thinking and autistic thinking lack clarity.

As an exaggerated form of normal thinking, and still more so as

a pathological form, autistic thinking is dereistic, i.e. maladapted to, or oriented against reality. It is shortcut thinking in which broad spheres of reality are ignored, and data are used selectively to support self-preferred thoughts. Identitities and time relationships are being confused. Even outright contradictions with reality may be disregarded. Proof or disproof is disliked as a criterion of truth. As evidential tests are resisted, wish fulfilment takes precedence over the search for truth.

Autistic thinking -- the type that is unrelated to psychosis -- emerges when particular mental elements dominate associations and memories, and gain easy access to consciousness. It arises most easily from insecurity with respect to areas where knowledge is inadequate to solve practical problems, where logic is hard to apply, and where reality is poorly understood as well as subject to discordant and contradictory interpretations.

As one of its outstanding characteristics, autistic thinking involves the vast overrating of certain ideas and other factors of interest. Furthermore, it is unreceptive to stimuli and communications from "out" groups. In more severe cases, positive suggestibility toward "autistic" ideas and negative suggestibility toward "adverse" thoughts (which are being shut out), result in impermeable frames of reference. Within those confines thinking moves in strict isolation from outside knowledge and criticism. The enclosed ideas interact only with one another. Ultimately an entire "system" may emerge which, while it shines from its coherence, is deficient in fact and proof, and must be accepted on faith and hope.

In conflict constellations, autistic thinking tends toward delusions, obsessive apologies, megalomania, and persecution. It may be perpetuated by fear and hatred, and is liable to be manic.

Only part of this description of autistic thinking is applicable to the polygraphers. However, the following factors do apply:

1. According to Bleuler, autistic thinking is frequent in areas of uncertainty, such as medicine where, Bleuler emphasized, "the drive to help is still too quick and uninhibited, deliberation as to how and where to help too slow and halting ... Hence the many mistakes and the zealous medical activity in maladies which get better by themselves as well as in those which are incurable." Psychology is likewise an area where autistic thinkers can enjoy themselves. Polygraphy must be one of the better paradises for autists.

2. The reluctance or unwillingness to apply tests of validity, by itself, is a strong indicator of autistic proclivities.

3. The attribution of near-infallibility to the polygraph, and necessarily also to the polygraph operator, discloses substantial,

perhaps megalomanic over-evaluation of a limited capability.

4. The drive to know people's innermost secrets, which has been prevalent in much historical pathology, is related to an excessive libido dominandi. For many inherent reasons, such a desire or drive tends to become progressively stronger.

Autistic thinking bedevils the polygraph also in lesser ways. The examiners are conditioned to adopt autistic patterns -- otherwise they would fail to obtain results. Interrogators who utilize polygraph data need various protective forms of autism lest they be psychologically compelled to move into different professions. The syndrome affects the use to which the machine is put, the communications between examiners, interrogators and interrogatees, and the confidence placed on findings. On their part, the users of those findings tend to adopt autistic formulas. Autistic thinking also exists in the policy-making groups.

This is the main reason why the program is kept going without major concurrent endeavors to recast and improve it, or else recognize shortcomings honestly.

Autistic thinking, it should be stressed, is not restricted to polygraph matters. It can easily be discovered in almost any professional organization or governmental department. Agencies which care about their continuing efficiency and success should become more knowledgeable about this type of pathology. Indeed, autistic thinking cannot fail but cause error and anomy. Fortunately, as a group affliction, autistic thinking can be cured. It merely must be recognized as what it is. The difficulty is to achieve the required recognition. This is a field where under our system of separate powers, Congress could help the Executive to find itself.

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What needs to be done? Aside from the government becoming conscious of its structural "psychiatric" difficulties, a new policy should, as a minimum, involve the following changes:

1. Extensive validation studies should be undertaken using advanced mathematical statistics and factor analysis, as well as experiments to determine the diagnostic power of the polygraph and related instruments. The total number of tests already given should be analyzed statistically, and experiments should be run to show the statistical significance of different existential and test situations, and of human typology. This project should be given the highest priority.

2. Pending completion of such studies, the use of the polygraph should be drastically curtailed, and indiscriminate and mass use be stopped. If validation studies show that the polygraphy gives

only poor results, or if validation studies prove to be infeasible, use of the polygraph, except for research purposes, should be terminated.*

3. Techniques should be devised to make it possible to append to each polygraph test a "level of confidence" evaluation. This evaluation should be quantitative and be derived from statistical methodology. Whenever this is infeasible, only the customary legal rules of evidence can be held to be applicable.

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* Unless the Department of Defense is willing to combine polygraph tests with the reading of palms and the analysis of skulls (phrenology). Astrology also might be employed, especially if findings on trustworthiness-in-future are required. Now that we are in the space age, DoD may know more about the effects of celestial bodies than Galileo who rejected Kepler's idea that the tides were caused by the moon's attraction. We ignore the mechanism by which planetary constellations could affect humans; but this is not the reason why astrology remains unusable. Astrologers made many surprisingly accurate predictions; but this is not the reason why astrology is now usable. Astrology is and will remain unusable so long as its performance is statistically invalid. The same rule should apply to polygraphy.

4. Scientific efforts to study the interrelationships between mental, psychological, and physiological states and to improve diagnostic instruments and techniques should be reviewed, possibly reoriented, and supported.

5. Fresh analyses of interrogation methods, including the pertinence of questions concerning private matters, such as sexual behavior and general feelings of guilt, must be performed, in view of the possibility that such questions may be irrelevant, may do psychological harm, and may in fact artificially create

criminality.* It also needs to be determined whether questions of this type are required for correct diagnosis. If so, techniques must

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* Aside from creating fictional crimes like witchcraft, the following mechanism may operate: a criminal deed involves intent (dolus) and act (e.g. killing), so that the intent to kill plus the actual killing constitutes murder, whereas killing (e.g. by accident) minus intent constitutes manslaughter. A person with strong criminal intentions such as an acute "Oedipus complex" may experience extreme guilt feelings which in one way or another may have physiological effects; but in actuality he is guilty of nothing. Frequently persons attribute to themselves guilt, e.g. "my relative died because I did not take good care of him". There are cases where both an intent exists and a related event occurs, but the relation is merely in the respondent's mind, not in reality. For example, A wishes the death of B, and B is killed by a truck in a distant town. A obviously has no guilt whatsoever, but he may believe himself to be guilty. Such guilt feelings can be very strong in superstitious persons. In security investigations political opinions are involved, including disagreements with official policy, which the testee may find expedient to conceal. Questions of self-image and role also are at stake. The whole vast complex of private and sub-conscious thoughts and emotions could affect polygraph readings.

be elaborated by which necessary questions can be asked without embarassing the individual and without confronting him with threats which tend to reduce, and possibly eliminate, his willingness to co-operate and to destroy his responsiveness on a polygraph.

6. Considerable work must be done to develop a curriculum for personnel specializing, on various levels, in psycho-diagnostic activity. Also, analysis is needed to determine how the diagnosis of truthfulness or untruthfulness can be optimized. Should it, for example, be based on the judgments by several fully trained specialists using the results of multi-disciplinary analysis? And should persons under security control forever remain at the mercy of investigative agencies?

7. Procedures must be analyzed through which records of polygraph examinations are preserved or destroyed, summary findings

are inserted into security records, and such data are utilized in repeated security checks. The impression prevails, perhaps wrongly, that mistakes by the investigated person as well as by the investigative organs can never be purged.

8. There is the related requirement to review the criteria which the Defense Department is using to determine suitability and eligibility. Some criteria reflect standards which, for better or worse, no longer are regarded as valid by the society at large and which cannot, therefore, be enforced against the 2% or more of the American population which is working for DoD. Furthermore, few criteria have been formulated with a specificity sharp enough to allow meaningful interpretation and feasible compliance. Hence the administration of behavior-becoming-an-officer often is inspired by double standards

of morality. Hypocrisy may be demanding its rights, but it is no proper basis for running security programs. In addition, "suitability" rules and their capricious application make the use of psycho-diagnostic techniques unduly difficult. This is so because virtually no one is protected against challenge on the basis of suitability. Hence everybody is motivated to conceal whatever he fears may be seized upon.

9. The legal situation of psycho-diagnostics must be clarified. In the case of adverse findings, the allegations, interpretations, or findings by investigators must be subject to challenge and appeal. The testee must have the right to advocacy and defense by diagnostic experts and lawyers.

* * *

It should be remarked that hostile intelligence services like to recruit American military and civilian personnel through sex blackmail. American bachelors abroad rarely adhere to the canons of chastity, and no one joins the armed forces to lead a monastic life. Entrapment is easy, and not only foreign-born and homosexuals can be blackmailed. The ease of blackmail is a function of "Victorianism": to the extent that sainthood is insisted upon, penetration tactics are facilitated, precisely because the hypocrisy is blatant.

In future, questions will arise with respect to individuals who, in their student days, participated in "campus revolutions" and held membership in subversive organizations, but who after reflecting upon their experiences and maturing in their thinking, changed their outlook completely. As matters stand today, applicants who were

juvenile revolutionaries but subsequently become loyal Americans, cannot be sure their "past" will not be held against them. In my judgment, the rule should be to determine whether the conversion was genuine and if so, to accept the person; but not to reject him because when he was young, he was immature.

* * *

This leads to still another complex problem. The polygraph is used within the framework of overall personnel selection policies. It commands itself to administrators who, quite understandably, want an "objective" method. Their hope for push-button pre-programmed selection is paired with the fact that personnel officers are, for the most part, concerned with administrative routines, mostly "paperwork", and don't perform as judges of men who recruit the cream of our youth.

Their investigations are similar to the work which admissions offices perform in universities -- but there is no real equivalent within the government for the selection which is accomplished by performance as judged by professors and examination boards.

In terms of security checks, negative findings usually rule out applicants without much further consideration, and some criteria are applied almost automatically. If an office wants a particular applicant very badly, and if the negative findings are not too serious, he may be hired in spite of his handicaps. But on the whole, the selection process stresses elimination according to negative criteria -- it is not a constructively oriented undertaking.

Whether negative or positive, findings tend to be made "blind", that is, no attempts are made to check, through prolonged interviews

with the applicant, whether the findings are correct. If the applicant is rejected, he is not told the reasons, and he lacks the opportunity of replying to, and correcting erroneous judgments, if such did occur. If he is hired, his file will still contain a lot of false information, which may never be corrected and which may cause trouble at a later time. Sometimes, obvious absurdities are disregarded and from time to time a person is asked about allegations, but there is no guarantee that corrections will be made.

I do not imply that the government is too restrictive with respect to security risks. I am rather inclined to believe the opposite. But a major problem is involved here: To be truly useful in a defense job, a person needs particular mental attitudes and strong motivations. He cannot be just another "warm body" -- an expression which neatly

characterizes the main preoccupation of the usual personnel officer. If the applicant always paid his debts, is merely a "social drinker", is clearly not a homosexual, never participated in communist activities, and also has the called-for educational credentials, he should have no troubles getting a safe life-time job in the Defense Department. But are those pre-requisites good enough?

The "warm body" the Defense Department needs must be interested in defense, knowledgeable, eager for continuous learning, committed to hard work, motivated to adhere to the principles upon which this government is built, and courageous enough to stand up for his convictions. If he lacks those characteristics, he is not qualified to hold responsible defense jobs.

But if this is true, then the hiring and promotion practices of the Defense Department should be inspired by the principle that

applicants must be selected for their positive qualities, and not just for the lack of defects. If recruitment were accomplished on this basis, substantial savings in manpower and costs could be effected and the hold of "Parkinson's Law" could be broken.

In order to adopt such a novel policy, new types of personnel managers would be needed. A particular requirement exists for educated -- and wise -- personnel officers who are able to conduct in-depth interviews and form valid judgments on a person's aptitude, suitability, reliability, and commitment.

Such in-depth interviews would come after background checks and -- in the case of persons already on the payroll -- after investigations of alleged wrong-doing have been completed. The interviewer would have all the facts, including doubts about the interviewee's veracity,

and he would deal with all relevant questions.

Provided the doubts were cleared up, the in-depth interview should uncover a person's vulnerability to hostile ideological appeals and other subversive inducements. This determination should be the supreme task of the entire investigation. It is rather incredible that no program was ever instituted to diagnose the mental and psychological vulnerabilities of defense personnel to that which, for lack of a better term, I will call "political seduction". Next to agent infiltration, this is the problem which should be of the greatest concern to American security agencies; and it cannot be managed merely by applying a theory concerning vulnerability to blackmail, whose inadequacy should be self-evident.

Again, it may be argued that such determinations would pose

insuperable constitutional problems. But every person who serves the Defense Department in a military or civilian capacity takes an oath to defend the Constitution of the United States. Accordingly, it is entirely appropriate to find out what the person knows about the Constitution, and why, and to what extent, he wants to defend it. In giving proper weight to a person's oath it is not unimportant to elucidate whether the individual knows anything about the threats which an enemy may direct against him, personally, in order to entrap him into serving a hostile cause.

In all this, psycho-diagnostics could play an enormously constructive role. But before any real progress can be made, high-level policy decisions are required to face up to the psychological dimensions of security.

Henceforth psycho-diagnostic activities should be based on the

realization that man is not a fictional bundle of predetermined reflexes.

All defense-related agencies should realize that inquisitorial methods derived from autistic thinking are useless, self-defeating, illegal, and unconstitutional, and also are dishonoring the American defense establishment upon which, at the present time, peace on earth is depending.

To be viable, internal security programs must be kept within the confines delineated by the U.S. Constitution, including the Bill of Rights.

If and when these basic points are finally grasped -- but not before -- psycho-diagnostic research may begin to turn from fake to fact.

Appendix

A Case Study: The French Revolutionary Tribunal

Stefan T. Possony

Inquisitorial agencies usually terminate their activities under circumstances which prevent them from writing their own post mortem assessments. There is one exception, however: the revolutionary tribunal of France, which was activated on 17 August 1792, and which went out of business on 31 May 1795.

During its lifetime, the tribunal conducted hundreds of quasi-legal trials and pronounced a minimum of 2,600 death penalties.

The tribunal was dominated by Antoine-Quentin Fouquier-Tinville who officially acted as prosecutor but who, in reality, cumulated the functions of prosecutor and judge. Fouquier was the outstanding representative of the phenomenon known as La Terreur, and he sent to

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their death virtually all those persons who were sacrificed at Paris.*

The tribunal killed the family of Louis XVI, royalists and conservatives, aristocrats and commoners, priests and scientists, as well as five of the commanding generals who had won victories for the revolutionary regime. If it had not been disbanded in time, it would have executed General Hoche who saved France in 1795. In addition to killing numerous victims who had no political significance whatever and executing wives of suspects, and more distant relatives, the tribunal managed to exterminate most of the leading revolutionaries, starting with the moderates and liberals, and finishing with the left radicals and extremists.

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* Terrorist activities also were conducted elsewhere, notably by Tallien at Bordeaux, Lebon at Arras, Carrier at Nantes, and Couthon, Fouché and Collot d'Herbois at Lyon.

In its last verdict, the tribunal condemned to death Fouquier and his collaborators, who were extremists themselves and who had acted as the most willing tools of the extremist Jacobins. This sentence was the only justified verdict the tribunal rendered.

Barely any of the about 2,600 death penalties pronounced by the tribunal before 27 July 1794 -- the day when Robespierre fell -- were legitimate punishments for delicts listed or defined in the French penal code, or for deeds for which the death penalty was allowed or prescribed. Barely any of the sentences were based on sufficient evidence. Barely any of the victims were granted the right of adequate defense by counsel.

The tribunal whose two sections performed in the misnamed Hall of Liberty and the equally misnamed Hall of Equality, was established when France was severely threatened by outside invasion and internal

subversion and insurrection ("La patrie est en danger.") There is no question but that the threat was enormous and that energetic measures were required to keep the country going.

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In line with the Law on Suspects of 17 September 1792, the tribunal was set up to suppress the internal threat. This law defined categories of suspects and decreed that all suspects, i.e. the entire categories, should be arrested. Those people could be "legally" kept in jail indefinitely even after acquittal. Of course, it was practically impossible to arrest more than a small fraction of the categories.

No one has ever been able to show that the tribunal made the slightest positive contribution to the security of France. Nor was it <u>really</u> designed to ensure internal security. Its real purpose

was to assuage rage and to make blood flow.* A good case can be made for the contention that the tribunal had disastrous short and long range consequences for French national interests.

Could the tribunal have done a creditable job in line with the purposes the French legislature had in mind? Perhaps. But the tribunal fell victim to autistic thinking, which is the professional disease of inquisitorial agencies. All such agencies necessarily work on a quasi-legal and supra-legal basis and are forced into distorted thinking. In revolutionary France the legislation from which the tribunal was derived was itself permeated by autistic thinking.

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* This appears clearly from the data given by Albert Soboul, The Sans-Culottes, New York, Doubleday Anchor Books, 1972, pp. 158-161. Soboul's report on this point is not suspect: he is general secretary of the Annals of the French Revolution and views the terror dispassionately, almost sympathetically.

Many legislators had become fanaticized and others had not thought deeply about the legal and constitutional problems of persecution.

* * *

On 15 January 1793, the legislature, then the National Convention, declared Louis XVI guilty of "conspiring against the liberty of the nation and of criminal attempts against the general safety of the state". The vote was 716 to zero, with 12 absences and 5 abstentions. Total parliamentary membership was 749. Hence it is not clear what happened to 16 votes.

There was some "probable cause", such as could be deduced from Louis' secret correspondence with foreign princes, which perhaps justified the indictment of the ex-king. But the proceedings were illegally constituted; the delicts were not properly defined as they applied to

the king; problems of ex post facto law were ignored; two days of interrogation did not suffice to elucidate the facts; the same two days were not enough to allow a properly documented and reasoned defense; and the bland assumption that Louis was lying to the Convention was not proved.

Moreover, if Louis was guilty, so were his ministers and at least 200 of the legislators who voted him guilty; and so were several of the prominent revolutionaries who, the king's secret papers showed, had been "bought" by the monarch.

Not surprisingly, the Convention deliberated 25 hours about the penalty.* In the end, 387 out of 721 deputies (54%) voted for the death penalty, with 5 votes being unaccounted for. It is unlikely that

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* Peter Kropotkin, The Great Revolution 1789-1793, New York, Schocken, 1971, p. 339. Kropotkin agreed with verdict and penalty but provided data to suggest that the sentence was unjustified and the trial was illegal.

the death penalty would have been imposed if the legislators had not been put under mob coercion mostly organized by the radical clubs of Paris.

* * *

The tribunal lived up to the model of the convention, its parent organization, but it went much farther. The evidence on the autistic thinking by the revolutionary committee includes the following items:

1. Similarly as the Spanish Inquisition was addicted to the auto-da-fè and Stalin's inquisition was committed to the "conveyor belt", so the work of the tribunal was geared to an instrument which assumed a horrid life of its own -- the "sainte guillotine". This expression was coined by René-François Dumas, friend of Robespierre and president of the tribunal. Appropriately Dumas was himself killed by the "holy" machine.

2. Joseph Cambon, one of the leading politicians and the financier who had sold the confiscated lands of the clergy to serve as backing for the assignats (paper money), stated this standard autistic thought: "Do you [the government] want to face up to your economic problems? Use the guillotine. Do you want to pay the immense costs of maintaining your fourteen armies? Use the guillotine. Use the guillotine, again and again."

3. Sympathizers among the population expressed thoughts of this kind: "There will be no bread unless we spill some blood." "Not enough blood is flowing." "Is the guillotine working today? ... Yes ... there is always somebody betraying somebody or something."* (Whether such thoughts caused the terror or were instilled by pro-terror propagandists is hard to say. They virtually ensure bad government.)

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* Soboul, p. 159ff.

4. The legislature and the tribunal declared entire categories of people to be "hors la loi" -- to those citizens the law of the land did not apply and in the name of equality, they were denied the equal protection of the law. The Law on Suspects outlawed the following categories: partisans of tyranny, enemies of liberty, public officials fired from their jobs, aristocrats and their families, emigrés, etc., as well as those who could not explain their means of subsistence.

5. Through a supplementary law of 10 October 1793, more categories were added: persons who through "astute speeches undermine the energy of the people", those who spread "bad news while pretending to be aggrieved", and those who "while always having the words of liberty, republic, and patrie on their lips, consort with former aristocrats, counter-revolutionary priests ... and are interested in their fate." Finally, an extraordinary catch-all category was defined: "Those who though they did nothing against liberty, also did nothing for freedom."

The categorization of humans and the steady enlargement of

proscribed categories of outlaws can be observed in the inquisitions which were conducted against heretics, witches, and marranos, in Hitler's extermination projects and undertakings, and in Stalin's purges. The International Military Tribunal of Nürnberg was initially seized with lists of categories comprising perhaps one-sixth of the German nation but strictly limited the scope of its responsibility to a small manageable number of major war criminals.

6. As the number of the "outlaws" was growing, so punishments became more severe. At the beginning, mere detention was envisaged and moderate sentences for those legally convicted were anticipated. Speedily, each suspect who had been arrested more or less at random became a defendant, virtually every defendant was convicted, and regardless of the imputed crime, death sentences were pronounced and almost never were commuted.

* * *

In this progression of autistic thinking, persons were tried against whom no indictments were drawn up and in whose trial no witnesses appeared; indictments were fabricated of whole cloth; the taking of evidence was invariably most perfunctory; disculpatory evidence either was not procured or was disregarded and suppressed; the seriousness of the charge often was proportionate to the lack of proof -- the accused were deemed to be successful in concealing their guilt; the testimony by defendants was twisted; letters written to defendants by persons unknown to them were handled as incriminatory evidence against the accused; no appelate procedures existed and sentences were not reviewed, instead they were executed speedily. In several instances, identities were confused but the person whose identity had been mistaken was neither acquitted nor spared from execution. This type of occurence also is reported from the

Stalin purges, the Freissler trials during the last months of the Hitler regime, and the "crusade" against the Albigenses. ("Among the dead, God will recognize his own.")

Although the tribunal was given a huge task, only a miniscule staff was assigned to do the work. Thus, the tribunal had the choice of dealing either with a small number of cases thoroughly or with a large number superficially. A very large number of cases was in fact handled, on the typically autistic assumptions that guilt can be determined easily, swiftly, and conclusively, and that in view of the importance of the mission, errors barely mattered.

In the case of Marie Antoinette, pressure was applied to put her on trial, despite the fact that Fouquier himself complained that he was not given the requisite incriminatory documentation. Inter alia, the former queen was accused of acts which were entirely legal. In other instances, facts were

twisted, and the meaning of her activities misinterpreted and falsified. She also was charged with chance events which happened without actions on her part. (Several false charges about Katyn which were proffered at Nürnberg were silently dropped without the defendants being acquitted on the relevant count.) Marie Antoinette was given no chance of putting up even a modicum of defense and was promptly executed. No one ever thought of clemency.

Since Marie Antoinette was born an Austrian, she belonged to a proscribed category which rendered her automatically guilty of high treason. Her membership in other proscribed categories made her death inevitable.

The autistic character of the tribunal's proceedings also is illustrated by the wholly fabricated contention of the Queen's

sexual misconduct with her son -- a charge which even Robespierre regarded as incredibly stupid. Princess Elisabeth, here sister-in-law, a saintly personality, was accused of sexual misconduct with Marie Antoinette.* Elisabeth was executed without being charged with a crime other than family association.

Admiral d'Estaing, ancestor of the President of France, was executed because he appeared as witness in the trial of Marie Antoinette. He testified she said during a mob attack on the palace: "If the Parisians come here to assassinate me, I will die at the feet of my husband, and I will not flee." This testimony sealed his fate.

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* Jean-Baptiste Carrier who conducted the noyades (drownings) in the Loire near Nantes celebrated "republican marriages" by tying together naked men and women before throwing them into the water.

When the time came for Fouquier and his associates to be tried, the tribunal self-critically surveyed its operations and found them unacceptable. There were not merely a few abuses but numerous breaches of law and downright crimes. The bill of particulars drawn up against Fouquier and company was derived from this assessment. It included the following items:

Persons who never had known one another were indicted as co-defendants and tried together in one single courtroom action. (This feature also typified Stalin's purge trials.)

To empty crowded prisons, escapes by criminals were organized to entrap the political prisoners and obtain pretexts for mass executions.

Indictment, trial, judgment, and execution often took place on one and the same day.

Legal irregularities became progressively more frequent and included sentences and executions which were not based on formal bills of particulars and other verifiable legal documentation.

Executions were carried out in the absence of verdicts.

The identities of defendants were confused in such a way that some persons who were neither charged nor convicted, were executed, while others who were condemned to death, stayed alive.

In one instance the father was tried instead of the son, despite the fact that both individuals were present and the confusion could have been cleared up. A few days later the son was convicted in lieu of the father. (This incident is particularly revealing with respect to autistic thinking: the prosecution simply had to be right and it was not about to admit or correct mistakes.)

Charges were made on freely invented delicts not defined by any law.

Judgments often were signed before the accused appeared in court. (The prosecution is right a priori. Hence indictment is all that counts. Procedures in court are mere formalities which are not really necessary.)

Defendants against whom no witness testified, i.e. against whom no evidence was adduced, were sentenced together in group actions, with supposedly guilty co-defendants whom they never knew before. (The linking of unconnected elements is a characteristic of autistic thinking.)

Convictions were drawn up on blanks and executed, without specific sentences being imposed on individual defendants. On those forms names were added or crossed out, including names of persons already executed. (This means, inter alia, that court records were adjusted to reflect the executions which actually had taken place. It also means that

groups instead of individuals were sentenced. Please observe that those groups were not conspiratorial coalitions but were thrown together as random collectives.

Pregnant women were often executed swiftly to forestall medical certification or even examination.

A person was called to the court. As several persons of the same name were in the cell, they all were arraigned, sentenced, and executed.

Two arrestees showed pity for persons condemned to die. They were indicted, judged, and executed.

Disculpatory evidence was usually disregarded, with the prosecutor and the court even refusing to read relevant documentation. The rights of defense were denied to defendants, except that court-picked defense lawyers were allowed to go through pro forma and fake motions. (Typical of Stalinist trials.) In one

case, five persons were indicted for having planned the murder of Robespierre: the accusation was untenable because at the time of the incriminating act the suspects were in prison. They were nevertheless executed. (This type of arrangement was particularly characteristic of Stalin's purge trials.)

The public prosecutor selected the jury and participated in jury deliberations.

The public prosecutor influenced and threatened witnesses.

The public prosecutor served as tool of political struggles.

The public prosecutor put pressure upon arrested suspects to make them produce denunciations of arrestees he wished to liquidate. The prosecutor often wrote such denunciations himself and obtained signatures from prisoners.

The public prosecutor indoctrinated witnesses before

they were allowed to testify. One indoctrinated witness who "leaked" the incident was sentenced to death.

When a rare defendant was acquitted, the public prosecutor usually exhibited rage and attempted to "get" the "escapee" by imposing double jeopardy.

The public prosecutor had the habit of ordering the guillotine erected and having the charettes (carts) wait in full view of the defendants. Such spectacles were enacted before the trials started.

The public prosecutor also had the habit of enjoying himself at the executions.

Sadism is rarely absent from autistic inquisitions. As we have seen, sex and sex imagery also manifest themselves. In addition, criminal proclivities, such as theft, bribery and embezzlement, are frequently present. Fouquier, too

may have enriched himself, yet the evidence seems to be ambiguous. It is clear that Fouquier was a "true believer" in the righteousness of his cause.

Vested professional interests should not be forgotten. Inquisitions are jobs and they provide incomes for many people.

* * *

The reader is invited to visualize the tribunal's system to be equipped with polygraphs. Thereupon he should imagine that until recently he occupied positions of trust and suddenly discovers himself to be hors de loi and to be questioned about entirely normal official and personal acts, each of which can be misinterpreted or distorted by hostile interrogators and judges. In such a case the polygraph would feed hecatombs of victims to Madame Guillotine. Most of the victims would be innocent by the canons of any legal system which respects human and civil rights, and this might even apply to polygraphers who proved unable to beat the machine. But all victims would be guilty by the canons of an autistic inquisition. The spread of "guilt" throughout society engulfing

millions of people has been well documented in the case of Stalin's purge trials.* The main point is this: guilt is being manufactured.

What was Fouquier's defense? That he was only a little wheel within a big system; that he and his associates only followed orders; that he only carried out the law; that he did not pronounce judgments; that the tribunal experienced many difficulties; that the tribunal was less radical than demanded by "public opinion"; that higher authorities ignored the tribunal's representations and complaints; and that he and his collaborators were innocent -- as they probably

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* See, for example, Alexander Weissberg, Conspiracy of Silence, London, 1952, and more generally, Robert Conquest, The Great Terror, New York, 1968. On the psychological methods of interrogation practiced by Stalin's experts, see Alexander Solzhenitsyn, Gulag Archipelago, New York, paperback edition, 1974, pp. 103-117. "We lambs were forbidden to lie, but the interrogator could tell all the lies he felt like." (p. 106).

were by the lights of their own autistic thinking. This defense did not help much, especially since those in higher authority had meanwhile been executed by their own obedient servant.*

Fouquier's defense is the classic one of all inquisitors who, to their utter surprise, find themselves to be the target of authentic judicial inquiry. (Their expectation that they can get away with their abominations indefinitely is an astonishing but extremely strong indicator of autistic thinking. Only few of the tribe have a long life expectancy.)

Equally classic was the defense of Carrier who insisted on being accorded all the legal rights which he himself never thought of granting to those who had fallen into his hands.

Of the nine leading inquisitors including Fouquier, five were executed for cause as the inquisitional operation was closed down, and one died, within the year, in deportation. Only three survived,

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* Most of the data on the tribunal are based on Henri Wallon, Le Tribunal Révolutionnaire, 10 mars 1793 - 31 mai 1795, édition nouvelle, 2 vols., Paris, Plon, 1900, pp. vol. I, 109-112, 121, 126, 129, 131, 133, vol. II, 507, 531-534, 541, 543, 554, 560, 566.

including Fouché. They saved themselves by taking a leading role in the termination of the inquisition. This, too, is classic: unless they are mentally sick or completely perverted, intelligent inquisitors know full well that they are doing wrong. And they soon bet on another horse.

France made an effort to repair the damage and sought to indemnify the victims or rather their survivors. But the shame of the tribunal révolutionnaire can never be erased.

* * *

We don't have a revolutionary tribunal in this country, but we have a few potential and eager Fouquiers who wouldn't mind establishing such an institution. Our autistic thinking is mercifully still quite moderate. Precisely for this very reason it is useful to identify the model which tells us where certain trends could lead. We don't have an inquisition, but our security system has inquisitorial

features and is akin to an extra-legal and quasi-legal set up. In a country which knows only law that is derived from the Constitution, double-track justice is hardly admissible.

How could the French monstrosity happen? Fear, hatred, lust for revenge, envy, ideological passions, and political power struggles were among the general conditions of this prolonged crime. But the major conditions sine qua non were as follows:

1. Despite the fact that the trials were public, the illegality of the proceedings, for a long while, was not widely or properly understood. This was due to inadequate as well as distorted press coverage, to the by no means unjustified mistrust by the public of many suspects, and to blood-thirsty lynch mob excitement. As soon as this psychology changed, the crimes of the tribunal made it

possible for the "out" group to overthrow the "in" group and to do so with strong and lasting public acclaim. In other words, the inquisitional abuse helped the opposition in their struggle for power. It could well have helped the enemies of the country.

2. Given the initial ingredients of autistic thinking and the psychological need to rationalize murder as a profession, the progression of the mental affliction was dependent on the combination of de facto secrecy, public acclaim, the stilling of criticism, isolation, and mutual distrust and fear among the inquisitioners.

3. The role of the public prosecutor was crucial. He enjoyed a great deal of political influence at the top level. Supposedly, he received every evening his orders from the Committee of Public Safety (i.e. the government), and thus ensured his own protection. It is likely that he merely told the Committee about his plans and secured approval. He was in a position to threaten and blackmail the Committee and each of its

members, partly because he was acting under orders. He also was able to threaten his political opponents. He selected and influenced juries and judges, and picked the tribunal's presidents; all of those who were attached to the tribunal he kept under control through his ability to threaten them. All investigations were manipulated by him. He had the power to suppress legal defenses, partly because he could arrange the calendar and partly because he could blackmail the defense lawyers. Regardless of whether the actual trials were public, the prosecutor's real power and the uncontrolled use of this power remained secret. There was no opposition to his autistic progression -- no obstacle which would have forced him to review his activities. All persons involved in the inquisitorial operation derived their power -- and their jobs -- from the same political source. For as long as the inquisitors were omnipotent, the practice of adversary proceedings,

which is the basis of good law, remained inoperative.

The lesson the U.S. might profitably learn from the unfortunate French model story is this: It is mandatory that internal security be ensured and strengthened. But this imperative task must be accomplished without an "outlaw" legal system which progressively, and inevitably, will fall victim to autistic thinking and which, therefore, must fail.

The ultima ratio of American security cannot be an undergraduate expert in a backroom, who barely knows the "three R's" of behaviorism (rats, reflexes, responses). In my judgment, the battle for effective internal security should be joined precisely on the issue of law against inquisition.

ADDENDUM TO STATEMENT SUBMITTED FOR THE RECORD.

HOOVER INSTITUTION
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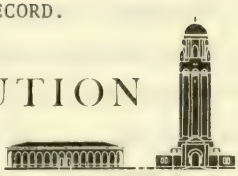

Hon. William S. Moorhead
Chairman
Foreign Operations and Government Information
Subcommittee
Room B-371-B
Rayburn House Office Building
Washington, D.C. 20515

July 17, 1974

Dear Mr. Chairman:

A perusal of the data submitted to your Committee convinces me that the scientific efforts devoted to polygraph matters could easily rank as the worst program sponsored by the government. It should be obvious that most of the relevant problems are ignored entirely.

In spite of my scepticism, I always believed that the polygraph machines would be working with top reliability. Now it turns out that the machines and the maintenance procedures are defective and that my optimism was naive. I am sorry to say that lack of care must reflect on the professionals.

I call your attention to the astounding metamorphosis from "lie detection" via "polygraph" to "stress evaluation". Apparently the instruction in semantics which is provided to the polygraphists

is quite successful. But we call the communists names when their semanticists reinterpret "dictatorship" as "democracy".

To evaluate stress, the student polygrapher receives 5 hours of instruction on the nervous system, 3 hours on the cardiovascular system, 2 hours on the respiratory system, and 2 hours on pharmacology, a total of 12 hours, with an additional 22 hours devoted to basic physiology and anatomy, and to normal and abnormal psychology. With 34 hours of relevant instruction, the student is being prepared "to make determinations concerning the mental and physical suitability of prospective polygraph examinees." If this sort of schooling is adequate, our medical schools and psychology departments must be wasting a lot of time. Or is a "determination" not a "diagnosis"?

Speaking of stress -- this is a bodily phenomenon, and it is largely harmful. If stress is employed deliberately on a human being, such as an American soldier or a civil servant, he is put both under psychological and physical pressure, and he may be damaged. This double mental and physical aspect of stress raises interesting constitutional questions, doesn't it?

I note the recurrent argument that the polygraph -- because it has so many defects -- should be used only on personnel engaged in

national security affairs, intelligence, and counter-intelligence. My own logic tells me that if the polygraph is unreliable and invalid or, at any rate, has not been proved to be valid, it should not be used on security and intelligence personnel either. What's the point in getting undependable answers and in practicing machine-fabricated self-deception?* One does not utilize bad aircraft to fly the most important missions: such missions are flown with the best aircraft that can be designed. This same philosophy needs to be applied to the fields where the polygraph could be relevant. If directors of intelligence entrust the security of their operations to polygraphs, they would seem to be badly advised.

Our lackadaisical and amateurish approach may, in fact, endanger U.S. national security. It appears that the USSR is engaged in very serious efforts in the field of "psycho-energetics" which, unavoidably, must include psychodiagnostics. These efforts seem to be serious in the triple sense that they are on a substantial scale; are in the hands of properly qualified scientific personnel; and deal, inter alia, with the discovery and analysis of natural phenomena of potentially enormous significance.

A number of soviet programs on which general knowledge is

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* The same argument applies to "exculpation". Aside from the fact that guilt, not innocence is to be proved, why should investigation of a suspect be terminated because he produced possibly misleading indicators on a doubtful machine?

available in the United States appear to be centered on high frequency or Kirlian photography as their major research method. This photography, whose origins date back to the 1890's, utilizes energy fields created between two condenser-like plates by high voltage alternate currents. It also has been described as high frequency X-ray photography.

Professor Semyon D. Kirlian who together with the late Valentina Kh. Kirlian, has been the pioneer in this field, works at the Khazak State University, Alma Ata, Kazakhstan, USSR.

The exact nature of the phenomena identified by Kirlian photography is as yet undetermined. According to soviet scientists, the electrodynamics or biogenetics of living systems are being explored.

The pictures show that "organized substances" like organisms exist within a photographable envelope which may be an aura, a corona, or a "new" form of energy or matter. According to some researchers, organisms may be emitting gases or light, or they may be associated with plasmas of free electrons and protons. Whatever it is, and it may be an artefact, it is made visible by Kirlian photography.

My knowledge on the subject is that of an outside observer. I am not reporting to you as a "true believer", let alone as an expert, but simply as an attentive reader. However, I sense a consensus among

qualified experts that Kirlian pictures are not artefacts and that, therefore, significant phenomena are involved in the exploration of which the USSR may be ahead of the U.S.

Many of Kirlian's pictures have reportedly been replicated in the U.S.

There have been in the U.S. two major conferences on Kirlian photography. One institute at the University of California, Los Angeles, and another at Sonoma State College appear to be engaged in Kirlian studies. Work is also being done at New York City College and at Stanford University. (I am not connected with the Stanford program.) All in all, some 20 to 30 institutions and about 500 persons, half of whom are scholars, have so far shown interest.

I recommend perusal of the following books:

Stanley Kripper and Daniel Rubin, The Kirlian Aura, Photographing the Galaxies of Life, New York, Anchor Press-Doubleday, 1974 (with bibliography).

Ostrander S. and Schroeder L., Psychic Discoveries Behind the Iron Curtain, Englewood Cliffs, N.J., Prentice Hall, 1970.

The matter is also discussed in the 1973 Britannica Yearbook of Science and the Future, p. 81f.

Professor William A. Tiller, Department of Material Science, Stanford University, Stanford, Cal. 94305, a major contributor to the Kripper-Rubin book, is highly knowledgeable on the subject. I believe that he would be willing to report to the Committee.

As I see it, Kirlian photography may be of importance in psychodiagnostics, including the detection of deception. It appears to register emotional arousals and experiences, such as tension, excitement and fear. It provides indicators about inter-actions between humans, including testers and testees, as well as between "fields" (environments) and organisms. It may allow detection of drugs and hypnotic states. Supposedly there is a possibility of "thought photography" but I have not checked the literature on this. In general, Kirlian photography would present a <u>whole</u> or holistic picture of the testee going far beyond the conventional set of psycho-physiological data. All this might help "lie detection".

On the other hand, the technique may facilitate training in auto-suggestion and in the controlling of otherwise uncontrollable body functions or, to put this differently, it may improve the effectiveness of relevant Yoga techniques. This means that it could enlarge the capabilities for "beating the machine".

Furthermore, Kirlian photography would seem to allow basic research, in the proper meaning of the term, on energy channels in the human body, on human organisms as autonomously active and open systems, and on the synergy of interacting humans. It may detect changes which do not originate in one particular part of the body, i.e. changes of the whole. It may provide, before symptoms appear, early diagnostic warning about bodily and mental illness, and it may be usable for therapeutic purposes. If a new type of energy were being discovered, and it would seem as though energy is necessarily involved, then a profusion of new vistas must be opening up.

Kirlian photography is, however, merely a pioneer technology, and U.S. researchers, notably Prof. Tiller, are moving forward in new directions. Tiller thinks he is dealing with "tomorrow's physics". He also thinks the current evidence shows that man has more than five senses and that it may be feasible to activate or instrument the senses which are latent or unrecognized.

It should be observed that originally the soviets were eager to make relevant albeit generalized information available to American researchers. Does this mean they initially discounted the strategic relevance of the new phenomena? If so, the soviets changed their mind.

At present they are very secretive about the subject, yet they are keeping U.S. efforts under close surveillance. The soviet scientist who supplied a chart on psychoenergetic programs in the USSR is now in jail.

At a recent conference in Prague a rumor was circulated that the communists are at work on a mind control technology having a range of up to 50 miles. This may have been so much propaganda, but I learned from an independent ex-soviet source that for many years there has been functioning in Moscow an institute which is researching thought control methods for military purposes.

We better recognize that while we are fiddling on a very squeaky instrument, the soviets may be doing serious and forward-looking work.

Sincerely,

Stefan T. Possony

APPENDIX 4

STATEMENT FOR THE RECORD SUBMITTED BY THE HON. SAM J. ERVIN, JR., A SENATOR FROM THE STATE OF NORTH CAROLINA

STATEMENT

by

SENATOR SAM J. ERVIN, JR.

for

HEARINGS ON

POLYGRAPHS AND SIMILAR DEVICES

Before the

SUBCOMMITTEE ON FOREIGN OPERATIONS AND GOVERNMENT INFORMATION

of the

COMMITTEE ON GOVERNMENT OPERATIONS

UNITED STATES HOUSE OF REPRESENTATIVES

June 5, 1974

Mr. Chairman, I am pleased to have the opportunity to present my views to the subcommittee concerning the use of the various "lie detector" devices. As Chairman of the Subcommittee on Constitutional Rights of the Senate Committee on the Judiciary, I have been aware of the increasing use of the polygraph and other so-called "truth detection" devices such as the Psychological Stress Evaluator (PSE) in the employment sphere. Government and private industry use these devices to determine the fitness of individuals for employment, for promotion, for dealing with security information or to determine ethical misconduct or violation of personnel regulations.

These machines provide a method of invading a man's mind to find what lurks in the innermost part of his mental consciousness for reasons which have nothing to do with his ability to perform a job. Examinees are asked questions concerning all aspects of their personal life. If the right to privacy means anything at all in our society, it means that people are entitled to have thoughts, hopes, desires, and dreams that are beyond the grasping reach of a bureaucrat, an employer, or an electronic technician. Enthusiasts for the polygraph and other "lie detector" devices fail to understand and appreciate how cherished the right of privacy is to each American and until this is understood there will be continuing violations of personal liberties.

On June 24, 1971, I first introduced S. 2156, a bill to protect the American people against the invasion of their privacy through the use of the polygraph and on December 20, 1973, I reintroduced that measure as S. 2836. The purpose of this bill is to protect the privacy and first amendment rights of all Americans. S. 2836 would not affect law enforcement or state or local governments but would prohibit the compelling of Americans to submit to polygraphs

in order to obtain or to hold a job in the federal government or in industries whose activities affect interstate commerce.

I am opposed to the use of such devices for federal employment and for employment in industries affecting interstate commerce for three significant reasons. First, there is the important challenge concerning the reliability and validity of such testing. Second, of grave importance to me is the loss of personal liberties through invasion of privacy. Third, there is a problem with the dissemination and the availability of such testing data.

The reliability and validity of the "lie detector" have been and still are under strong attack by those not associated with the polygraph industry. Polygraphs attempt to measure physical reactions, such as respiratory changes and skin perspiration to personal, controversial, or stimulating questions posed to the subject. They do not register the lie or the truth automatically. What is recorded is not the subject's veracity but his physiological responses to an examiner's questions and the graphs recorded are worthless unless "interpreted" by the examiner. It is his judgment and not some demonstrated physical fact that determines the truthfulness of the individual's response.

I believe that there are too many subjective judgments required in polygraphy to place such high reliability in the examiner's interpretation that the subject is being deceptive. One individual writing in connection with the use of the "lie detector" told of having had three such tests all in connection with employment. He had "passed" two of the tests. The one he "flunked" was the first he had to take. According to this individual, his responses were the same on all the tests. It is interesting that he was "judged" deceptive only on the first test. This Subcommittee has received persuasive testimony over the years regarding the technical unreliability of "lie detectors." For that reason I will move on to the other two points.

American citizens have been compelled to disclose all manner of personal information when subjected to these devices. They have been compelled to disclose these things despite the guarantees of the first amendment which protect the rights of the individual to the privacy of his mind, to the free exercise of his right to speak as well as his right not to speak his thoughts.

Polygraph and other "lie detector" testing used in pre-employment screening and after employment is secured violates the fourth amendment guarantee of "the right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures." These test instruments strip the subject bare of his thoughts in complete disregard of any expectations of privacy.

Employers use these machines to try to compel the individual to disclose social and legal offenses despite the guarantee of the fifth amendment which provides the right against self-incrimination. A "lie detector" test to innocent citizens simply wanting a job reverses our cherished presumption of innocence. If an employee refuses to submit to the test he is automatically guilty. If he submits to the test,he is faced with the burden of proving his innocence.

Many persons, including former Justice Goldberg, believe that the ninth amendment's reservation that "the enumeration in the Constitution of certain rights, shall not be construed to deny or disparage others retained by the people" clearly shows that the Founding Fathers contemplated that certain basic individual rights not specifically mentioned in the Constitution--such as privacy--should nevertheless be safe from governmental interference.

Many proponents of the polygraph argue that there are no violations where the examinee consents to the test. One can hardly consider the consent given by an employee to such testing to be voluntary given the pressures on an employee in the employment relationship. The unequal bargaining position of a prospective employee in face of the economic necessity of employment, and in face of the widespread requirement of submission to testing, necessarily removes that voluntary element which is crucial to the concept of consent. What you have is an invasion of personal rights through economic power.

We cannot afford to dismiss the human element in decision making where basic liberties are at stake. The individual does not surrender his basic rights and liberties as a citizen by entering the job market. Nor does he surrender his right to proper respect by his government for his privacy and other rights.

When government, either state or federal, makes the taking of a test a condition of securing public employment, I believe a violation of the fourth amendment and the fifth amendment is involved. It begs reality to say that the test is voluntary in employment situations. With government employment at about 4% of the total labor force, a "voluntary" decision to refuse a "lie detector" test means that a large proportion of employment opportunities is closed to the citizen who wishes to preserve his dignity and his privacy, and his constitutional rights. In point of fact, the requirement of a "lie detector" test as a pre-condition to public employment is an unconstitutional impediment, and should be barred by legislation such as my bill. And, as a matter of sound public policy, Congress should use its power over interstate commerce to bar the use of such devices from employment there as well.

The third area of concern to me is the dissemination and availability of the testing results. There is every likelihood that a record of the employee's responses may find its way into the personnel files of the company or agency and be transmitted as "reference material" when the worker leaves, despite assurances to the contrary. In fact, one individual who contacted the Subcommittee on Constitutional Rights told of his frustrating efforts to learn the contents of a polygraph test he had taken for employment with one law enforcement agency after learning that other law enforcement agencies he applied with had also seen the results. These agencies did not require such tests for employment. He was told that the results of his test were confidential!

An individual's privacy is directly affected by the extensive collection, maintenance, use and dissemination of personal information. When the results of "lie detector" testing are passed from one agency or business to another, an individual's opportunity to secure employment is being endangered by information from tests not yet shown to be valid or reliable. If our freedoms are to remain secure, it is more important than ever in this technocratic age that the individual be assured the information conveyed about him be correct, current, and relevant to the decision being made and that he have the right to see and correct piecemeal information about himself.

I am not questioning the right of an employer to hire whomever he feels would be the best candidate for a position or to dismiss an employee for cause. However, traditional employment screening procedures provide companies and agencies with ample access to sources of information on individuals. More thorough interviews, examination of references, questioning of past employers,

and regular stock inventories are all methods available to the employer for obtaining information which may sufficiently serve as the basis for an employment decision. One shareholder-employee in a large drugstore chain which had instituted a mandatory polygraph examination suggested that a better solution to the security problem would be to inaugurate a management training program. Such a program would involve detail training in personnel screening, store security, and other aspects of store management. Programs like this would not only serve as efficient methods of handling the security problem companies face but would also serve to bolster employee morale by indicating that the companies have faith in their employees' abilities.

Many proponents of "lie detectors" argue that they serve as a way of decreasing security costs for the employer. Some employers may well face increased costs by implementing methods such as I have described, but we must always keep in mind that we are talking about an area where basic individual rights and freedoms are involved. We must not be willing to allow the infringement of constitutional rights at the hands of "lie detector" examiners and employers who use the unreliable results of the "lie detector" devices in the employment sphere in hopes that it may decrease security problems when other methods are available. The costs of these programs must be weighed against the individual dignity of the prospective employee who is compelled by economic necessity to undergo the ordeal of the polygraph.

My concerns are not idle ones. Every American should be concerned and shocked that machines are being used to compel citizens to reveal their innermost thoughts about personal matters in order to obtain employment. Already over half the state legislatures of our land have shown their concern

in this area by either prohibiting the use of polygraph tests in connection with application for employment or as a condition to continuation of employment or by establishing licensing procedures for polygraph examiners. It is time that the federal government acted in this area. The members of Congress must face the "lie detector" problem and in their concern for personal liberties move to ban the use of polygraphs and other "lie detector" devices in the employment sphere.

I urge Congress to adopt legislation such as S. 2836 and prohibit the compelling of Americans to submit to such traumatic experiences in order to obtain or to hold a job in the federal government or in industries whose activities affect interstate commerce.

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